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Refrigerant Leak Detection System (RLDS) Installation and Operation Manual

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CE/FCC Compliance Notice Information

Class A compliance for RLDS under CE Requirements. Meets Part 15 Subpart B requirements of the FCC Rules. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. ETL, report no 3151009LAX-001 to:

ANSI/UL 61010-1

CAN/CSA 22.2 No 61010-1 & CE Mark

READ ALL INSTRUCTIONS CAREFULLY

If the equipment is not used in the manner specified by the manufacturer, the protection provided by the equipment may be impaired.

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1 Introduction

1.1. How to Use This Manual

This manual provides important information on how to install, operate, and service the RLDS.

Please read this manual carefully before use.

If you have a working knowledge of refrigerant monitors, you will find this manual useful as a reference tool. If you are new to the use of refrigerant monitors, you can educate yourself about the principles of refrigerant gas detection and the proper operation of this device by reading this manual thoroughly.

1.2. Notes

Emerson Climate Technologies Retail Solutions reserves the right to change the operation or specifications of this instrument at any time without notice.

If any errors or ambiguities are discovered in this manual, promptly inform Emerson Retail Solutions.

No part of this manual may be reproduced or recreated, in any form or by any means, without the express prior permission of Emerson Retail Solutions.

1.3. Safety Precautions

1.3.1. AC Power Supply

Ensure the source voltage matches the voltage of the product before energizing the equipment.

The RLDS uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 20 Watts.

It is highly recommended that the RLDS be placed on a separate circuit (with UPS or surge protection) and be connected directly to the AC power source.

A switch or circuit breaker rated 1.0 A, 250 VAC, with a minimum terminal spacing of 3.0 mm must be attached to the monitor's AC power leads. This switch must also be located in close proximity to the monitor, and be within easy reach of the operator. This switch should also be clearly marked as the monitor's type of equipment.

- A switch or circuit-breaker must be included in the building installation
- The switch must be in close proximity to the equipment and within easy reach of the operator
- The switch must be clearly marked as the disconnecting device for the equipment

1.3.2. Protective Grounding

Under no circumstances should the RLDS be operated without connection to a protective ground. Doing so poses a potential shock hazard and is also a violation of electrical safety standards applicable to this type of equipment.

1.3.3. Explosive Atmosphere

Do not operate this equipment in the presence of flammable liquids, vapors, or aerosols. Operation of any electrical instrument in such an environment constitutes a safety hazard.

1.3.4. Proper Exhaust Venting

It is imperative that the exhaust port on this instrument be properly vented as described in this manual. Failure to do so constitutes a safety hazard.

1.3.5. Working Inside Instrument

Extreme care should be exercised when accessing the interior of the monitor. Only qualified electrical maintenance personnel should perform connections and adjustments. Always de-energize the power supply before opening the monitor's enclosure.

1.3.6. Misuse and Modifications to the Instrument

The protection provided by the monitor may be impaired if the monitor is used in a manner not specified by Emerson Retail Solutions. Modifications to this monitor, not expressly approved, will void the warranty.

1.3.7. In Case of Malfunction

Do not continue to use this equipment if there are any symptoms of malfunction or failure. In the case of such occurrence, de-energize the power supply and

contact a qualified repair technician or the nearest Service Center. ONLY the provided knockouts are to be used for electrical and communication wiring. Drilling into the box will void the warranty.

1.3.8. RLDS Fusing

F1, F2	1AMP, 250VAC FAST ACTING (Type “F”)

Table 1-1 *- Fusing Requirements*

1.3.9. Installation Category

Installation Category II, Pollution Degree II, as defined by UL.

1.3.10. Altitude Limit

RLDS 6,562 ft (2,000 m)

1.3.11. Cleaning

If, during period maintenance inspection it becomes necessary to clean the outside of the case, use a **DRY CLOTH**. To avoid shock hazard and/or equipment damage, **DO NOT USE SOAP AND WATER.**

1.4. Warning and Caution Statements

1.4.1. Warning Statements

The use of the word **WARNING** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, or condition, or the like, which if not correctly performed or adhered to, could result in injury or death of personnel using this instrument.

1.4.2. Caution Statements

The use of the word **CAUTION** in this manual denotes a potential hazard associated with the use of this equipment. It calls attention to a procedure, practice, condition, or the like, which if not correctly performed or adhered to, could result in damage to the equipment.

2 Functional Overview

2.1. General Description

Refrigerant monitors are specified to support compliance to federal, state and local safety codes governing refrigerant emissions. Avoiding significant refrigerant loss reduces equipment replacement costs, maintains equipment efficiency, promotes safety, and protects the environment.

The RLDS provides for the continuous monitoring of refrigerant gas levels in up to 16 separate test *zones* or *channels*. The instrument is easily programmed to monitor a variety of gases and independent leak (small), spill (medium), and evacuation (large) levels may be designated for each zone. The instrument also retains a log of previous readings that can be easily accessed for analysis.

An audible alarm and front panel indicators are provided to signal alarm and fault conditions, and relay contacts are provided that can be used to trigger external alarm devices in the event of a system fault, or if a leak (small), spill (medium), or evacuation (large) level of gas is detected. The system also may be fitted with an optional two-channel 4-20mA current loop board for connection to remote monitoring equipment.

The RLDS requires only minor periodic maintenance such as the occasional replacement of filters. The monitor incorporates active diagnostics that continuously monitor the system for proper operation. A front panel indicator is provided to alert an operator of system malfunctions, and fault codes are generated that enable the user to identify the cause of the fault.

All 800# models of the RLDS come with the number of line-end filters (plus one extra) to match the number of zones for each model.

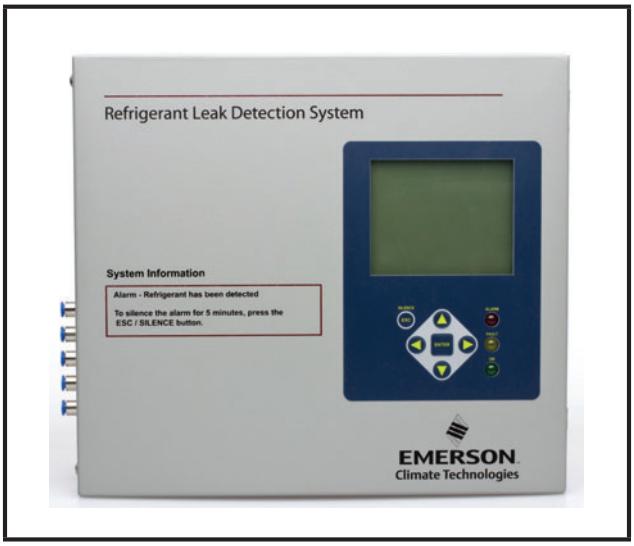

Refrigerant Leak Detection System
System Information
Alarm - Refrigerant has been detected
To silence the alarm for 5 minutes, press the ESC / SILENCE button.
EMERSON
Climate Technologies

Figure 2-1 *- RLDS Front View*

2.2. Communication Options

The RLDS features full two-way communications via an RS485 interface. MODBUS RTU is the communication protocol standard and can be connected directly to an E2, Einstein, or REFLECS controller.

Please refer to **Section 4,** *Connecting Communication Devices* for a more complete discussion of communication protocols.

2.3. Understanding Monitoring Levels

Effective use of this instrument requires an understanding of what constitutes reasonable alarm setpoints for the type of gases being monitored.

All AC&R systems leak some refrigerant. Refrigerant manufacturers define allowable exposure levels and threshold limit values in units of parts per million (PPM). In a good “tight” installation these background levels will be acceptably low and often do not require corrective action. You can reduce nuisance alarms and needless service calls if the alarm levels are set at practical limits.

Recommended monitoring levels based on compliance to ANSI/BSR ASHRAE 15-2007 and ASHRAE Safety Code 34-2007 have been developed and are listed in ***Table 8-1*** and ***Section 6,*** *RLDS Hardware Specifications*.

Setting the unit at these recommended alarm levels will satisfy the needs of most users. However, the PPM levels generated by system leaks into the environment are greatly influenced by the volume of air in the sampling area, air circulation, size of the leak, distance to the monitoring point, and a host of other variables. In some cases the set points may need to be adjusted either up or down to achieve effective monitoring. Please contact your representative (*770-425-2724*) for assistance in obtaining these levels.

2.4. Response to the Presence of Multiple Refrigerants

The RLDS is a refrigerant level monitor, not a gas analyzer. You must program the monitor to test for a specific refrigerant in each zone, and it will only return accurate concentration readings for that particular refrigerant. If a leak occurs of another refrigerant gas type, the monitor may return false readings.

Most applications only require detection of a single refrigerant and the problems that are associated with monitoring multiple gases are rarely an issue. If there is a possibility of multiple refrigerants leaking in the same sampling zone, you should consider carefully which refrigerant compound you program the unit to monitor, or make system design considerations to cover this event. Please consult your sales engineer for assistance in setting up the RLDS system to cover this event.

2.5. Suggested Location of Sampling Points

At the point of origin of a refrigerant leak, the gas is highly concentrated. As the refrigerant is dispersed into the air, the gas molecules diffuse, causing a dilution of the original concentration. The RLDS measures the refrigerant concentration at the sample collection point, so if the termination of the collection line is not at the exact point of the refrigerant leak, the unit will read a diluted mixture of the refrigerant gas and air and may require adjustment of alarm levels.

The farther away an RLDS sample point is from a refrigerant leak, the longer it will take to detect the leak, and the lower the concentration of refrigerant in the air will be; therefore, place the termination of the collection line as near as possible to the point where refrigerant leaks are the most likely.

It should also be noted that refrigerant gas is heavier than air and tends to collect below the point of a leak; therefore, samples taken near the floor will have a greater concentration of gas than those collected above the source of a leak; therefore, sampling points should ideally be located as close as possible to the source of potential leaks. If this is impractical, then the alarm setpoints should be adjusted for that zone to compensate for the dilution of the refrigerant gas. Line-end filters should be mounted 12” (30 cm) to 18” (45 cm) above the floor. **DO NOT** block any of the zones. Unused zones may be disabled by setting the distance parameter to zero feet in the zone setup screen.

The RLDS should be centrally located in the mechanical room and be readily accessible for easy visual monitoring and servicing. The combined length of sample tubing, plus exhaust tubing, should not exceed 1200 feet (365 meters) for any zone. The fresh air purge line should draw from an area that does not contain any refrigerant gas. The exhaust line should run to an outside location if possible. The combined length of the purge line and the exhaust line cannot exceed 300 feet (91 meters).

Ideally, two to three pick up points spaced around each chiller will provide sufficient coverage. It may be necessary to perform a “smoke” test of the mechanical room to determine the best locations. The smoke test would provide the pattern of air currents present in the mechanical room.

NOTE: For information about using the RLDS in wet locations, see Section 3.3.6., Considerations.

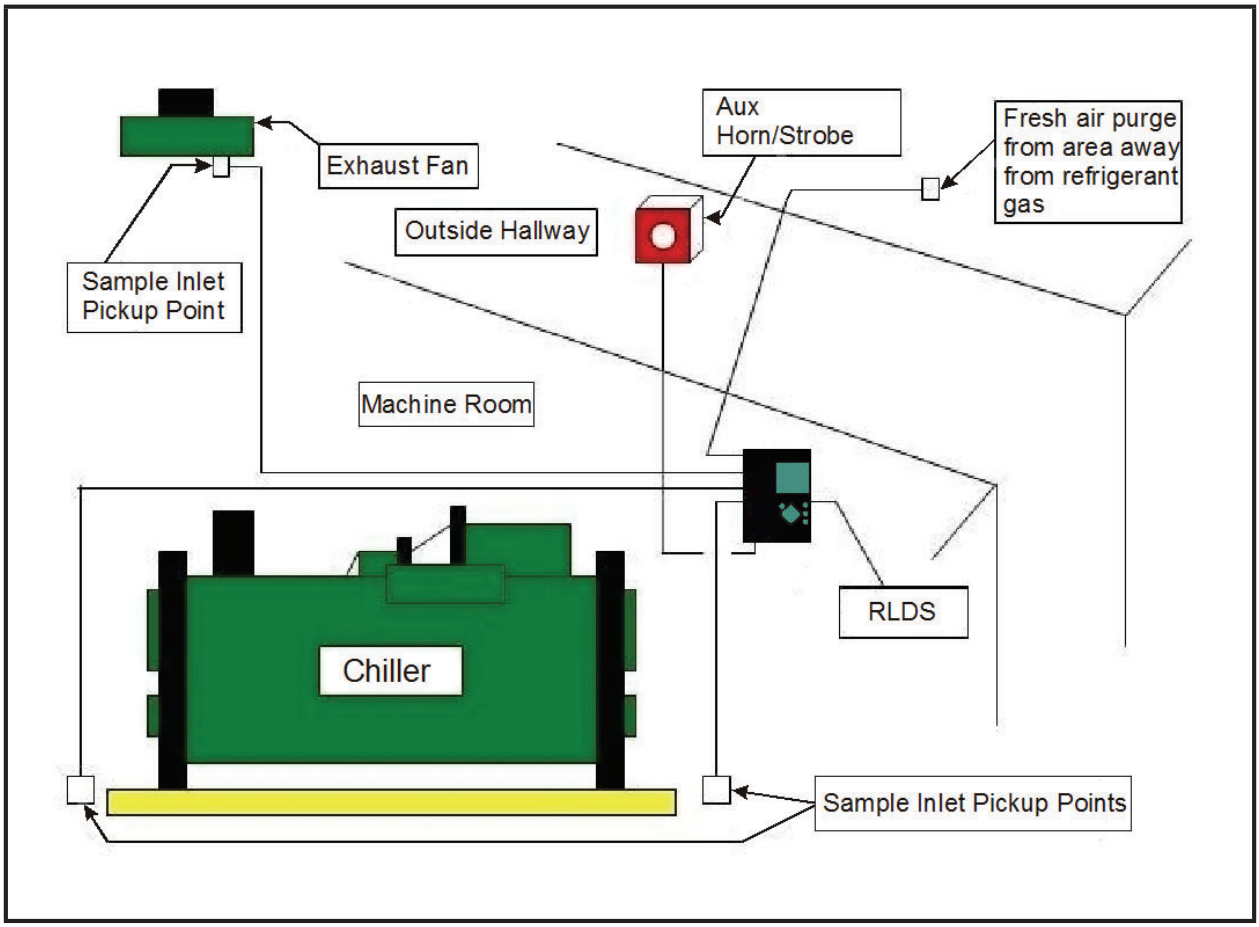


Figure 2-2 *- RLDS Mechanical Room Placement*

The user interface on the RLDS is the main interface by which you program the unit, acknowledge alarms, and observe conditions inside of the mechanical room. Note that there are two additional alarm relay contacts in the RLDS that can be programmed to alarm with **Leak**, **Spill**, **Evacuate**, **Fault**, or **Monitor On**.

3 RLDS Installation

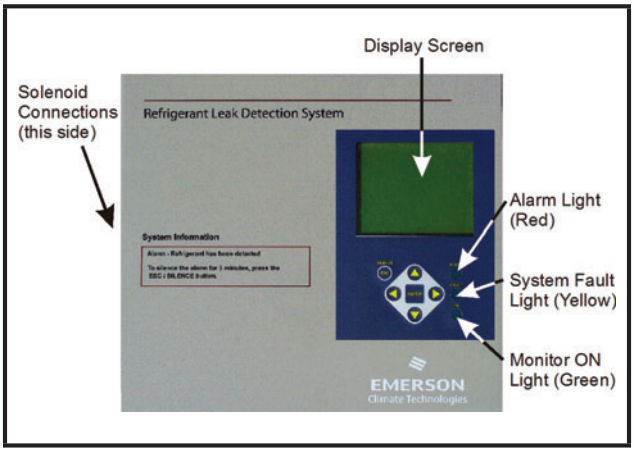


Figure 3-1 *- RLDS Diagram*

Standard accessories needed for a four (4)-point System:

Accessory	Part Number
Five (5) Line-End Filters (Assembly)	*275-0300*
Charcoal Filter	*275-0275*
RLDS Instruction Manual	*026-1309*

Table 3-1 *- RLDS Accessories and Part Numbers*

3.1. RLDS - Installation Considerations

3.1.1. Warnings and Cautions

WARNING: Explosion hazard! Do not mount or operate this equipment in an area that may contain or in the presence of flammable liquids, vapors, or aerosols. Operation of any electrical equipment in such an environment constitutes a safety hazard.

WARNING: Drilling holes in the RLDS enclosure may damage the unit and will void the warranty. Please use the knockouts provided for electrical connections.

WARNING: Shock hazard! Always de-energize the power supply before working on the interior of the equipment.

CAUTION: The RLDS contains sensitive electronic components that can be easily damaged. Do not to touch nor disturb any of these components.

3.1.2. Inspection

The RLDS has been thoroughly inspected and tested prior to shipment from the factory. Nevertheless, it is recommended that the monitor be re-checked prior to installation. Inspect the outside of the enclosure to make sure there are no obvious signs of shipping damage. Open the enclosure and inspect the interior of the unit for loose components that may have become dislodged during shipment. If damage is discovered, please contact Technical Support for assistance (*770-425-2724*).

3.1.3. Monitor Location

The RLDS should be centrally located in the facility and should be easily accessible for visual monitoring and servicing. Intake sample lines can be up to 1200 feet (365 meters), but it is important to remember that sampling cycle time is proportional to the total number and length of individual sample lines.

Dirt, grease, and oils can adversely affect the operation of the RLDS. The monitor should be installed out of direct sunlight in a clean, dry area that is not subject to temperature or humidity extremes. Installation of the monitor in a mechanical room is acceptable provided reasonable environmental conditions exist. If there is a question, consider installing the unit outside of the mechanical room in a cleaner area of the facility. The location should allow the monitor to be easily accessible for visual monitoring and servicing.

3.2. RLDS Mounting Instructions

3.2.1. Screw Locations

The RLDS should be installed plumb and level and securely fastened to a rigid mounting surface. The enclosure utilizes keyhole mounting brackets designed for 1/4” (6.35 mm) fasteners. Locate the four

screws as shown in the diagram below and allow the screw heads to protrude approximately 1/4” (6.35 mm).

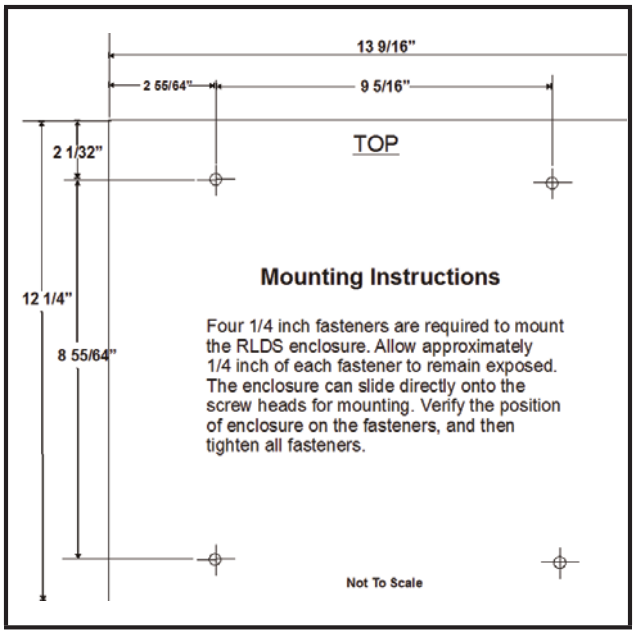

13 9/16"
2 55/64"
9 5/16"
TOP
2 1/32"
12 1/4"
8 55/64"
Mounting Instructions
Four 1/4 inch fasteners are required to mount the RLDS enclosure. Allow approximately 1/4 inch of each fastener to remain exposed. The enclosure can slide directly onto the screw heads for mounting. Verify the position of enclosure on the fasteners, and then tighten all fasteners.
Not To Scale

Figure 3-2 *- RLDS Mounting Dimensions*

3.2.2. Installation

Hold the monitor flat against the mounting surface and allow it to slide down, engaging the screw heads in the keyhole slots of the mounting brackets. Adjust the screws as necessary to hold the monitor securely against the mounting surface.

3.3. RLDS - Connecting Air Lines

3.3.1. Overview

Individual sample lines are run from the RLDS to each area of the facility to be monitored. Additionally, a purge line is installed to provide clean air for resetting the infrared zero baseline. An exhaust line is installed to vent residual gas away from the monitor. All air line connections, located on the left side of the enclosure, are indicated in ***Figure 3-3***.

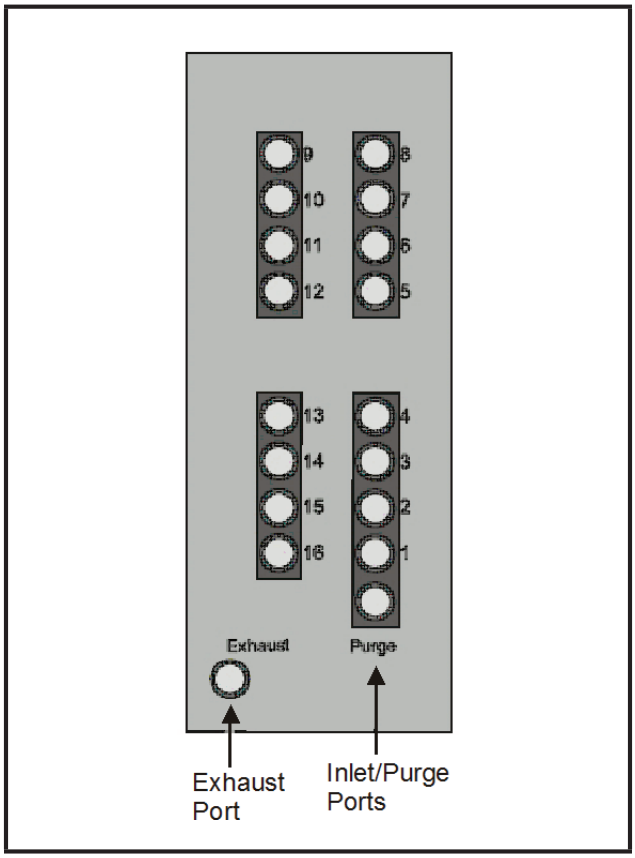


Figure 3-3 *- RLDS (Tubing Connections)*

3.3.2. Tubing Considerations

Use 1/4” (6.35 mm) outside diameter (0.04” wall) (1.02 mm wall) flex tubing for all air lines or equivalent. The tubing should be clean and free of residual moisture or other contaminants. The tubing should be cut cleanly with a sharp knife and care should be taken not to distort the tubing end.

To connect the air lines to the monitor simply push the tubing firmly onto the connector. To remove a line, depress the plastic ring on the connector with one hand while withdrawing the tube with your other hand. All tubing bends should have a radius of no less than 5” (12 cm) to ensure proper airflow. If kinks or obstructions occur in any of the air lines, the instrument may not function properly.

3.3.3. Connecting Purge Line

A purge line is required to draw fresh air *into* the instrument and should not exceed 300 feet (91 meters) in length. A charcoal filter assembly has been provid-

ed to ensure clean air is being drawn in through the purge line. This filter should be mounted close to the RLDS.

It is advisable to terminate the purge line outdoors, provided the input is not exposed to rain, snow, ice, exhaust fumes, or other airborne contaminates. If an outdoor installation is impractical, the line should be run to an area inside the facility that you are certain is not contaminated with ambient refrigerant gas.

A line-end filter should be attached to the end of the purge line. If this is not possible, an optional charcoal filter assembly (*P/N 275-0275*) can be used to filter refrigerant from the purge line, and may be mounted adjacent to the monitor. A line-end filter assembly (*P/N 275-0300*) should be attached to the end of the purge line when the charcoal filter is not used.

CAUTION: (CO_2 Only): Because CO_2 is present in ambient air, the purge line MUST BE run outside, away from any known sources of CO_2 gas. An atmospheric CO_2 concentration value can be manually entered by the user in the CAL screen. CO_2 is supported by RLDS-CO_2 units. See Section 8.9.4. CO2 Atmospheric Concentration (RLDS-CO2 Units Only).

3.3.4. Connecting Exhaust Line

An exhaust line (¼" OD tubing) (6.35 mm) can be used when it is required to vent gas samples away from the instrument and should not exceed 300 feet (91 meters). The exhaust line should terminate in a location that is completely isolated from the purge line termination point and other areas of the facility that will be monitored. Ideally this line should terminate outdoors in a location that is not exposed to the elements. This line does not require a line-end filter. If the exhaust line terminates outside the building, position the tubing so that no water or moisture can enter it.

3.3.5. Connecting Sample Intake Lines

The RLDS is designed to accommodate up to 16 separate sample intake lines. The standard configuration of the unit includes one manifold of four intake connectors and one purge connector. Additional manifolds can be easily installed to increase monitoring capacity. Please contact Technical Assistance (*770-425-2724*) for more information.

Sample intake lines can be up to 1200 feet (365 meters) when no exhaust tubing is used. Otherwise, the combined length of the sample line and the exhaust line cannot exceed 1200 feet (365 meters). All line terminations should be positioned to reduce the possibility of mists, aerosols, oil, water, dust, or other contaminates being drawn into the instrument. A line-end filter (included) should be attached to the end of each sample intake line. Line-end filters should be placed 12" to 18" (30 to 45 cm) above the floor.

IMPORTANT: DO NOT block any of the zones. Unused zones may be disabled by setting their length parameter to zero feet in the *Zone Setup screen* (**Section 8.2.,** *The Zone Screen*).

Please refer to the earlier section (**Section 2.5.,** *Suggested Location of Sampling Points*) to learn more about where to locate the monitoring points.

CAUTION: The introduction of contaminants through the air intake lines can result in serious and permanent damage to the monitor.

3.3.6. Considerations

For maximum protection, the RLDS may be shut down when a System Fault occurs. This might be desired, for example, when the RLDS is used in wet locations such as meat preparation rooms. When water is pulled into the system, a System Fault will occur, closing the fault relay located at the bottom of the main control board. To turn power off to the RLDS when this occurs, wire the fault relay into a spare 16AI input. Route the power supply to the RLDS through an 8RO output using the normally closed contacts. Program the E2/Einstein to alarm the fault input on a contact closure and turn on the 8RO output when this occurs. This can be done using a Digital Sensor Control application in the E2/Einstein. Refer to the E2 Installation and Operation manual (*P/N 026-1610*) for details on setting up a Digital Sensor Control application.

3.4. Splitter Kits

3.4.1. Overview

Two-way splitter (*P/N 275-0304*) and three-way splitter (*P/N 275-0305*) kits for a zone are used with the RLDS to allow you to pinpoint critical points of the refrigeration system, and allow further monitoring in small spaces with a high probability for leakage. Splitter kits allow you to place more sensors in each zone, which enable potential leaks to be detected more quickly.

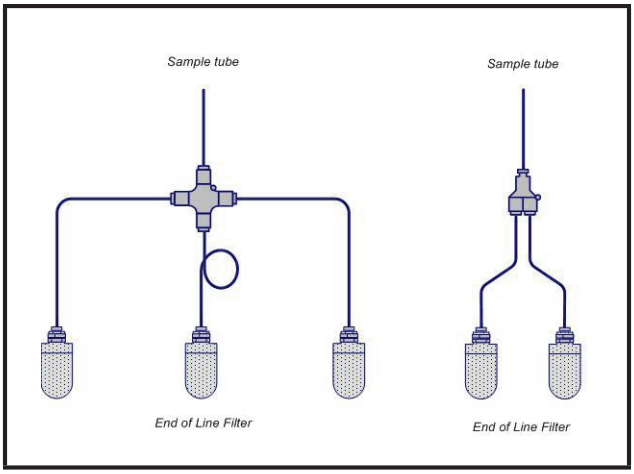


Figure 3-4 *- Types of Splitter Kits*

3.4.2. Installation

Sensors can be installed on walls, drains, or areas with potential air flow. Any ¼" tubing can be used to configure the two or three point sensors.

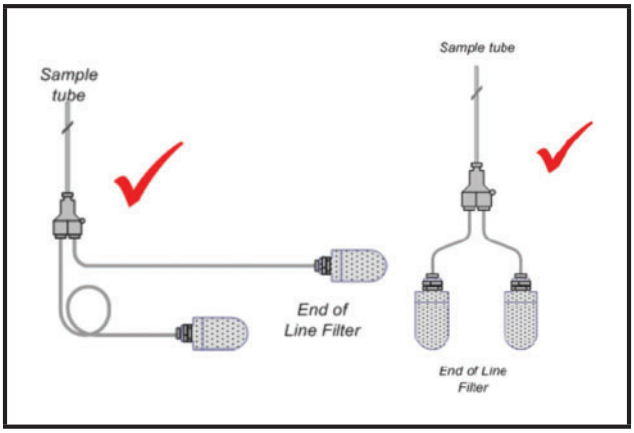


Figure 3-5 *- Proper Wire Length of a Two-way Splitter*

CAUTION: Keep pick-up tube the same length to create the averaging effect of the splitter system. Point the filter vertically downward or horizontally with a slight downward tilt to avoid moisture collecting in the filter from condensation.

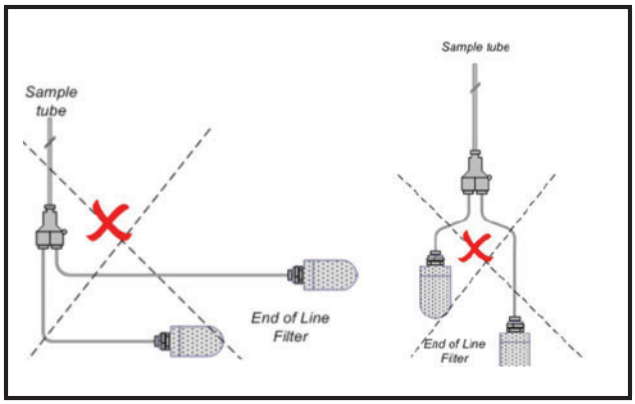


Figure 3-6 *- Improper Wire Length of a Two-way Splitter*

The alarm setpoint must be changed due to the averaging effect of the splitter system. The pick-up lines for the splitter tube must be the same length from the splitter to each of the end-of-line filters to balance the splitter system and create the averaging effect.

A two-way splitter kit requires reduction of the original alarm setpoint by ½ so the setpoint becomes half of the original value. A three-way splitter kit requires reduction of the original setpoint by ⅓ so the setpoint becomes a third of the original value.

For example, if the alarm setpoint alarm value is 1000, with a two-way splitter the value becomes 500 ppm. With a three-way splitter the value becomes 333 ppm.

Part Number	Description
275-0304	Two-way Splitter Kit contains: 1 two-way push-fit splitter, 2 line-end filters (tubing not included)
275-0305	Three-way Splitter Kit contains: 1 three-way push-fit splitter, 3 line-end filters (tubing not included)
270-0810	¼" Sample Tubing (100 ft.)

Table 3-2 *- Splitter Kit and Tubing Part Numbers*

3.5. RLDS Interior

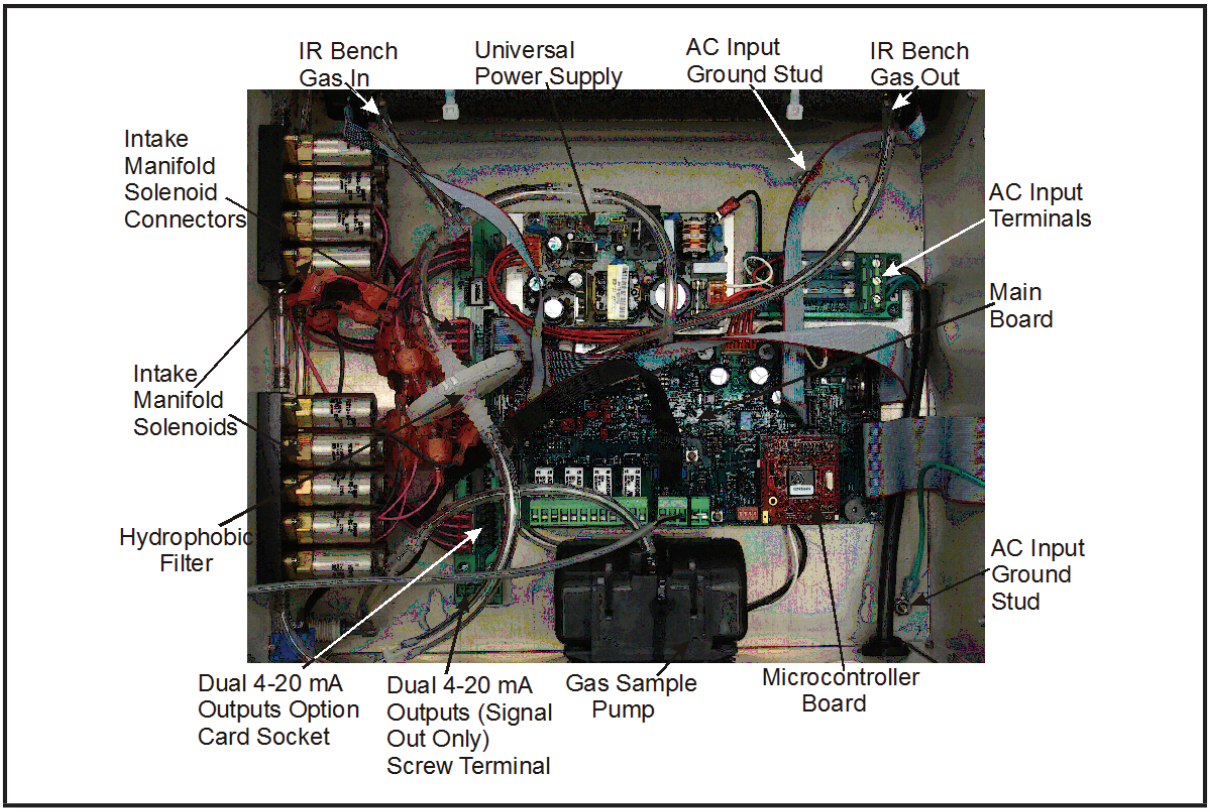


Figure 3-7 *- Diagram of RLDS Interior*

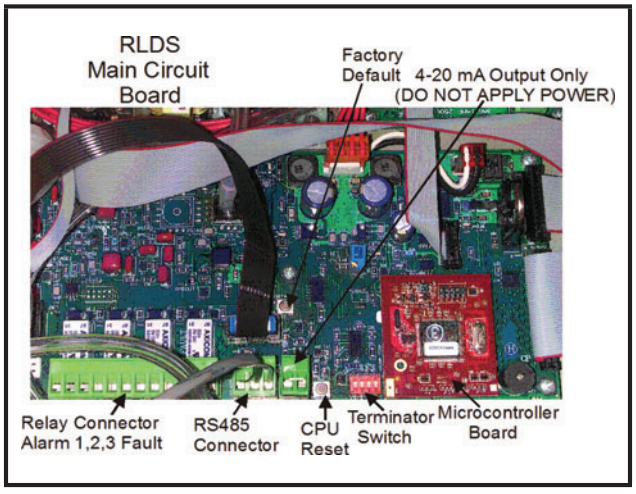


Figure 3-8 *- RLDS Processor Board Layout*

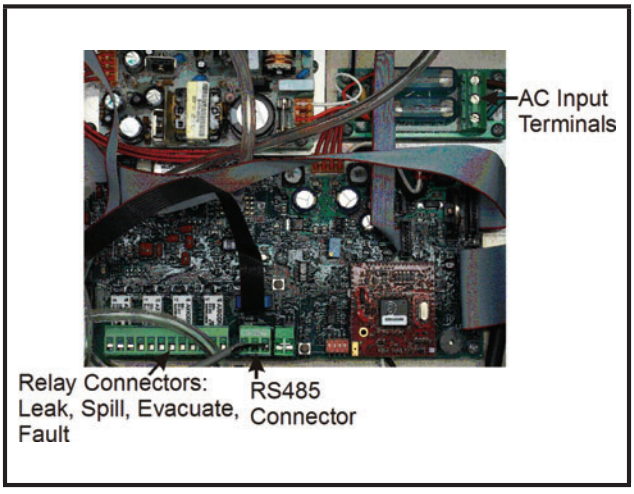


Figure 3-9 *- Relay, RS485, and AC Input Connections*

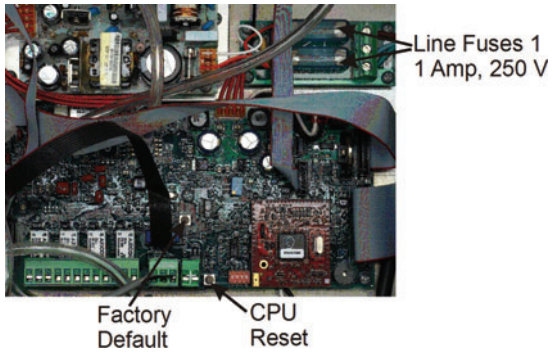


Figure 3-10 *- Switch and Fuse Locations*

NOTE: The plastic cable ties surrounding the air pump are to ensure safe handling during shipment. Remove before operating the unit.

Reinstall a plastic cable around the air pump if the unit is shipped back to Emerson Retail Solutions for service or repair. This prevents damage during shipment.

3.6. RLDS Electrical Wiring

The RLDS uses a universal power supply that is capable of accepting inputs of 100 to 240 VAC, 50/60 Hz. The monitor's power consumption is 20 Watts. It is highly recommended that the monitor be connected directly to the AC power source, preferably on its own circuit. The AC power connection should be completed with UL approved 3-conductor wire (minimum 16 AWG), rated 300 VAC at 221°F (105°C).

Locate a convenient service knockout and install electrical conduit in the typical manner.

Locate the AC Input Terminals and Ground Stud on the inside of the monitor (***Figure 3-7***). Secure the incoming AC power neutral (white/blue) and live (black/brown) wires to the LINE 1 and LINE 2 terminals.

Using the supplied crimp-on ring terminals, washers, and nuts, connect the incoming AC power ground wire (green) to the monitor's AC input ground stud, and then install a separate wire between the ground stud and the GND terminal.

NOTE: For more information on power specifications, contact your Emerson Retail Solutions representative for more information.

Locate the AC power connector on the inside of the instrument and remove it from the circuit board. Secure the wire leads to the connector orienting them as shown in the diagram. Carefully plug the connector back onto the circuit board. finally, locate the ground lug and securely fasten the ground lead.

A second connector is provided to wire an external device through the RLDS power circuit. Locate the connector and complete the wiring as described above.

3.6.1. Warnings and Cautions

WARNING: Electrical installation should be performed by a certified electrician and must comply with all applicable local, state, and federal electrical safety codes.

WARNING: Under no circumstances should this instrument be operated without connection to a protective ground. The AC power ground wire must first be connected to the monitor's ground stud. Doing so poses a potential shock hazard and is also a violation of electrical safety standards applicable to this type of equipment.

WARNING: Copper conductors for connection to supply mains must be made in accordance with NEC/CEC and local codes.

WARNING: Drilling holes in the RLDS enclosure may damage the unit and will void the warranty. Only use the knockouts provided for electrical connections.

- A switch or circuit breaker rated 1.0 A, 250 VAC must be attached to the unit’s AC power leads.
- This switch must also be located in close proximity to the monitor, and be within easy reach of the operator.
- This switch should also be clearly marked as the unit’s main AC disconnect device. The circuit breaker or switch must disconnect all current-carrying conductors (i.e., Live and

Neutral).

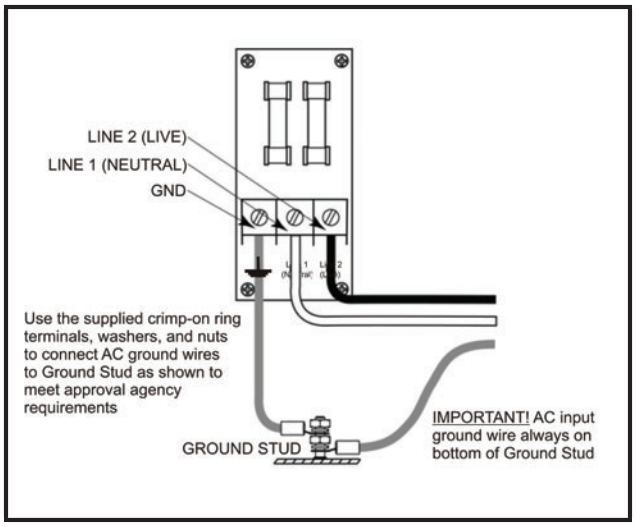

LINE 2 (LIVE)
LINE 1 (NEUTRAL)
GND
Use the supplied crimp-on ring terminals, washers, and nuts to connect AC ground wires to Ground Stud as shown to meet approval agency requirements
GROUND STUD
IMPORTANT! AC input ground wire always on bottom of Ground Stud

Figure 3-11 *- AC Input Power and Ground Connections*

4 Connecting Communication Devices

4.1. E2 MODBUS Direct Support for RLDS

4.1.1. Network Connection to E2

Connecting an RLDS to an E2 unit requires the E2 version 3.01 and above. Contact Emerson Retail Solutions for upgrade information if the controller is a version prior to 3.01.

4.1.1.1. COM Port Associations - E2 Versions 3.xx and Below

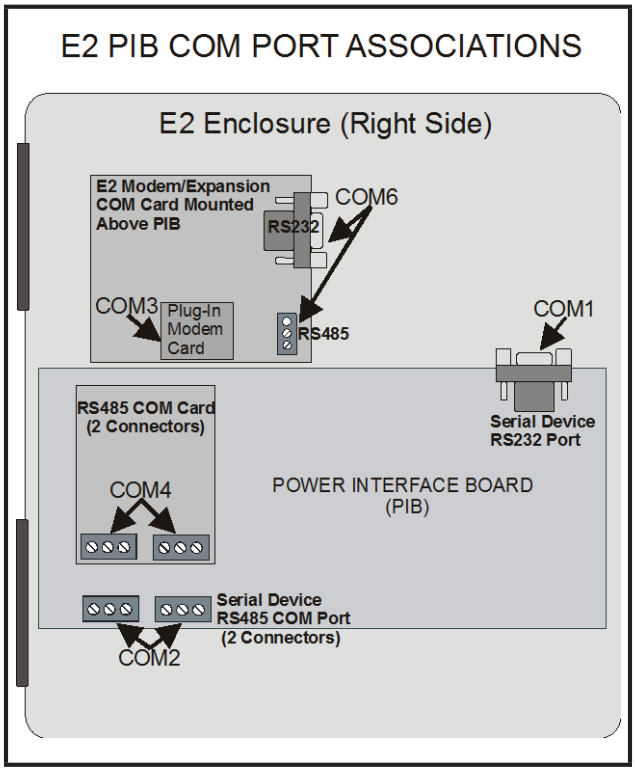


***Figure 4-1** - Location of E2 COM Ports - E2 PIB Board (E2 version 3.xx and below)*

An E2 has up to three COM ports that can be assigned for MODBUS communication (COM2, an RS485 port on the E2 power interface board, and COM4 and COM6, which are optional ports requiring expansion cards). COM ports can only be used for one function; in other words, if COM2 is set up as the I/O network, you cannot connect MODBUS devices to COM2. Ensure your E2 is equipped with an RS485 COM Card (P/N 637-4890) and configured in E2 General Services (Menu, &7, #3, !1, **Serial** tab) to enable COM4 or an E2 Expansion COM Card (P/N 637-4871) to enable COM6.

Connect the MODBUS network cable to the three-terminal connector on the COM port you wish to assign as MODBUS. Wire RS485+ to the RLDS+ RS485- to the RLDS- and the shield cable to the RLDS GND.

4.1.1.2. COM Port Associations - E2 Versions 4.0 and Above

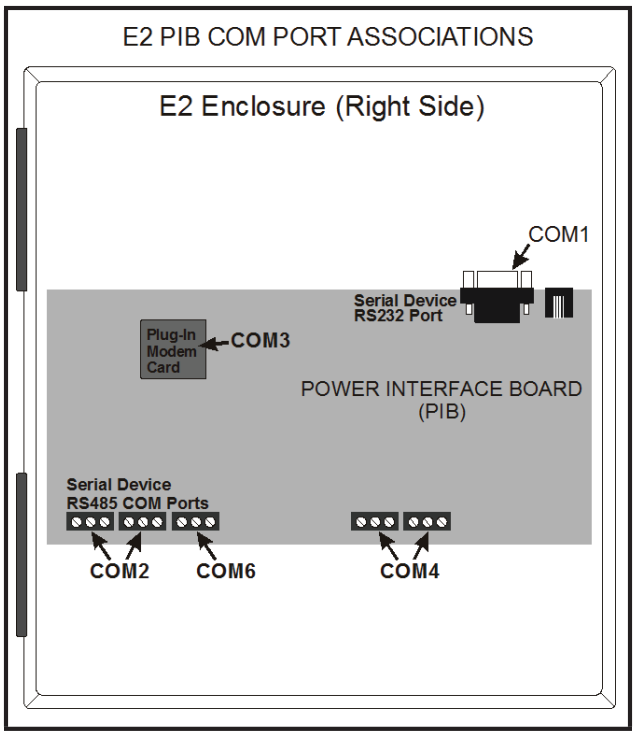


***Figure 4-2** - Location of E2 COM Ports - E2 PIB Board (E2 version 4.0 and above)*

An E2 has three COM ports that can be assigned for MODBUS communication (COM2). COM ports can only be used for one function; in other words, if COM2 is set up as the I/O network, you cannot connect MODBUS devices to COM2. Ensure your E2 is configured in E2 General Services (Menu, &7, #3, !1, **Serial** tab) to enable COM4 or COM6.

Connect the MODBUS network cable to the three-terminal connector on the COM port you wish to assign as MODBUS. Wire RS485+ to the RLDS+ RS485- to the RLDS- and the shield cable to the RLDS GND.

4.1.1.3. E2 Termination

For E2 versions 3.xx and below, if the E2 will be the first device in the daisy-chain, set the port's termination jumpers to the TERMINATED & BIASED position (all three jumpers UP); otherwise, set all jumpers DOWN if not the first device.

For E2 versions 4.0 and above, if the E2 is the beginning of all RS485 I/O or MODBUS Networks, all three of these jumpers should be set to the UP position. For MODBUS, the jumpers should all be in the top-most position (**MOD**). For I/O Net, the jumpers should be in the middle position (**I/O**). For no termination, set the jumpers to the down position (**NO**).

4.1.2. E2 Setup of RLDS

4.1.2.1. Set Up Network Ports

Before setting up a RLDS, the port on the E2 that has the MODBUS cable connected must be set up as a MODBUS port.

1. Log in to the E2 with Level 4 access.
2. Press Menu followed by 7 3 1 - **General Controller Info**.
3. Press Ctrl + 3 to open the **Serial** tab of the General Controller Info setup screens:

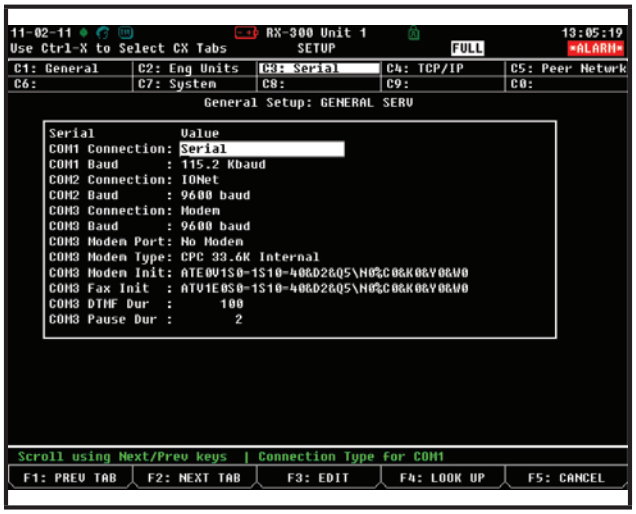

11-02-11 RX-300 Unit 1 13:05:19
Use Ctrl-X to Select CX Tabs SETUP FULL ALARM
C1: General C2: Eng Units C3: Serial C4: TCP/IP C5: Peer Netwrk
C6: C7: System C8: C9: C0:
General Setup: GENERAL SERV
Serial Value
COM1 Connection: Serial
COM1 Baud : 115.2 Kbaud
COM2 Connection: IONet
COM2 Baud : 9600 baud
COM3 Connection: Modem
COM3 Baud : 9600 baud
COM3 Modem Port: No Modem
COM3 Modem Type: CPC 33.6K Internal
COM3 Modem Init: ATE0V1S0=1S10=40&D2&Q5\N0%C0&K0&Y0&W0
COM3 Fax Init : ATV1E0S0=1S10=40&D2&Q5\N0%C0&K0&Y0&W0
COM3 DTMF Dur : 100
COM3 Pause Dur : 2
Scroll using Next/Prev keys | Connection Type for COM1
F1: PREV TAB F2: NEXT TAB F3: EDIT F4: LOOK UP F5: CANCEL

Figure 4-3 *- Serial Communications Manager Screen*

4. This screen will have a "Connection" field for all COM ports on the E2. Highlight the COM port connection field that will be used, and press F4 - **LOOK UP**. From the list of network types, select **MODBUS**.
5. Four fields will become visible underneath the COM port connection field, which pertain to the way the device communicates:
   - **Baud -** Default setting is **19200**. Leave this field at the default value.
   - **Data Size -** Leave this field at the default value (**8**).
   - **Parity -** Leave this field at the default value (**None**).
   - **Stop Bits -** RLDS value is one (**1**).
6. Press ↵ to save changes and exit.

4.1.2.2. Add and Connect RLDS

To enable communications between E2 and the RLDS, the devices must be added and addressed in E2.

1. Log in to the E2 with Level 4 access.
2. Press Menu 7 7 2 - **Connected I/O Boards and Controllers**.

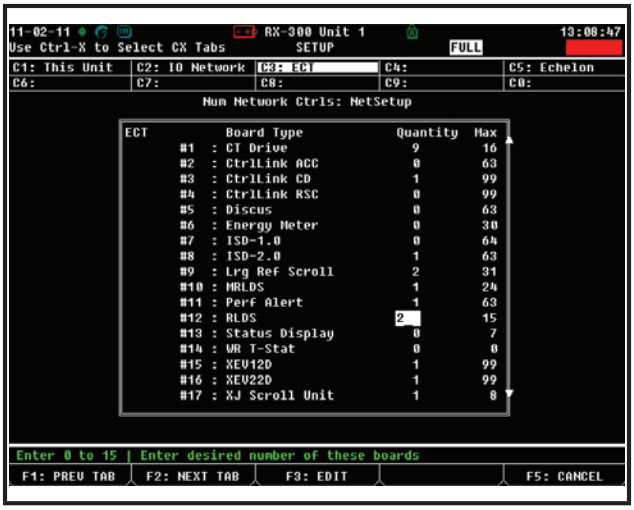

11-02-11 RX-300 Unit 1 13:08:47
Use Ctrl-X to Select CX Tabs SETUP FULL
C1: This Unit C2: IO Network C3: ECT C4: C5: Echelon
C6: C7: C8: C9: C0:
Num Network Ctrls: NetSetup
ECT Board Type Quantity Max
#1 : CT Drive 9 16
#2 : CtrlLink ACC 0 63
#3 : CtrlLink CD 1 99
#4 : CtrlLink RSC 0 99
#5 : Discus 0 63
#6 : Energy Meter 0 30
#7 : ISD-1.0 0 64
#8 : ISD-2.0 1 63
#9 : Lrg Ref Scroll 2 31
#10 : MRLDS 1 24
#11 : Perf Alert 1 63
#12 : RLDS 2 15
#13 : Status Display 0 7
#14 : VR T-Stat 0 0
#15 : XEV12D 1 99
#16 : XEV22D 1 99
#17 : XJ Scroll Unit 1 8
Enter 0 to 15 | Enter desired number of these boards
F1: PREV TAB F2: NEXT TAB F3: EDIT F5: CANCEL

Figure 4-4 *- Connected I/O Screen*

3. On the **ECT** tab screen enter the number of RLDS Panels in the **RLDS** number field.
4. Press ↵ to return to the Network Setup menu, then select 1 - **Network Summary** (***Figure 4-5***).

5. Locate the RLDS you added to the network list (press Page Up and Page Down to scroll through the list) and highlight with the cursor. Press F5 for Set-up.

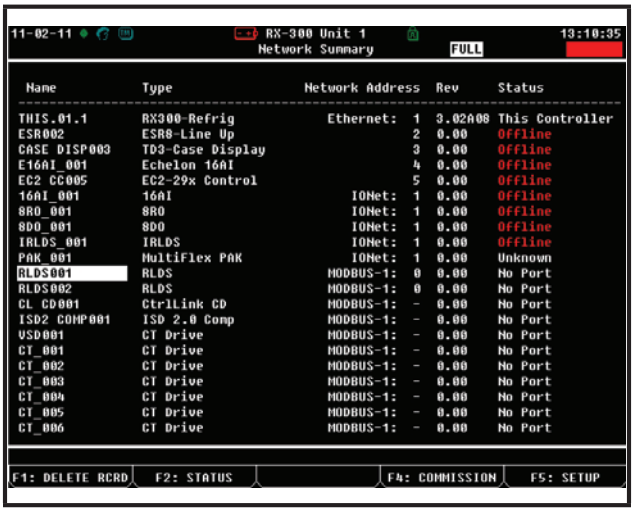

11-02-11
RX-300 Unit 1
Network Summary
FULL
13:10:35
Name Type Network Address Rev Status
THIS.01.1 RX300-Refrig Ethernet: 1 3.02A08 This Controller
ESR002 ESR8-Line Up 2 0.00 Offline
CASE DISP003 TD3-Case Display 3 0.00 Offline
E16AI_001 Echelon 16AI 4 0.00 Offline
EC2 CC005 EC2-29x Control 5 0.00 Offline
16AI_001 16AI IONet: 1 0.00 Offline
8RO_001 8RO IONet: 1 0.00 Offline
8DO_001 8DO IONet: 1 0.00 Offline
IRLDS_001 IRLDS IONet: 1 0.00 Offline
PAK_001 MultiFlex PAK IONet: 1 0.00 Unknown
RLDS001 RLDS MODBUS-1: 0 0.00 No Port
RLDS002 RLDS MODBUS-1: 0 0.00 No Port
CL CD001 CtrlLink CD MODBUS-1: - 0.00 No Port
ISD2 COMP001 ISD 2.0 Comp MODBUS-1: - 0.00 No Port
VSD001 CT Drive MODBUS-1: - 0.00 No Port
CT_001 CT Drive MODBUS-1: - 0.00 No Port
CT_002 CT Drive MODBUS-1: - 0.00 No Port
CT_003 CT Drive MODBUS-1: - 0.00 No Port
CT_004 CT Drive MODBUS-1: - 0.00 No Port
CT_005 CT Drive MODBUS-1: - 0.00 No Port
CT_006 CT Drive MODBUS-1: - 0.00 No Port
F1: DELETE RCRD
F2: STATUS
F4: COMMISSION
F5: SETUP

Figure 4-5 *- Network Summary Screen*

Each RLDS is assigned a MODBUS address automatically when it is created.

6. Locate the RLDS you set up, and look at each device's status in the **Status** field. You will see one of the following messages:
   - ***Online*** - The RLDS is communicating normally.
   - ***Offline*** - The RLDS is not communicating, has not been commissioned, is not functional, or is not powered up. Verify the RLDS is powered up, wired correctly, and has the proper network address, baud rate, and parity.
   - ***No Port*** - No port is set up in the E2 Serial Configuration Manager to be a MODBUS port.
7. To commission the device, select F4 - **Commission** and choose the MODBUS network address.

4.2. E2, Einstein, and REFLECS Controllers (The RLDS Gateway Board)

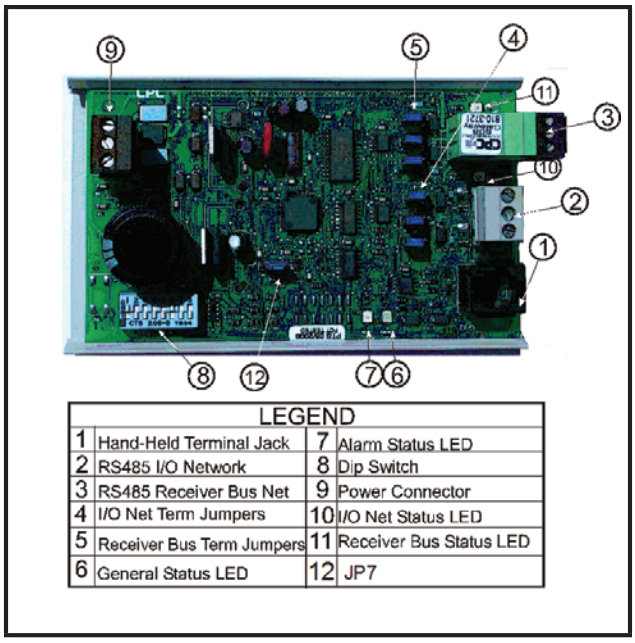


Figure 4-6 *- RLDS Gateway Board Layout (P/N 810-3760)*

NOTE: Before installing the Gateway board, verify that jumper JP7 (if present on the board) is set to the "NORMAL" position (not the "TEST" position). Operating the Gateway with the jumper in TEST position may cause board damage.

The RLDS may be connected to a Emerson Retail Solutions controller using a Gateway Board. The Gateway Board is a special interface device that allows an E2, Einstein, or REFLECS site controller to communicate with up to three RLDS units as if each of them were a standard 16AI Analog Input board, and allows for programming with the Hand-Held Terminal (HHT).

The Gateway Board communicates with the RLDS units via the MODBUS network, which is connected to the Gateway's "Receiver Bus" network terminal. The Gateway communicates with site controllers (E2, Einstein, or REFLECS) via the RS485 I/O Network (COM A & COM D for REFLECS).

In addition to being an interface with the site controller, the Gateway Board also allows you use a Hand-held Terminal (HHT) device to program the RLDS and view status.

4.2.1. Powering the Gateway Board

Input Voltage	24VAC, Class 2, 50/60Hz
Power	5VA

Table 4-1 *- Gateway Power Requirements*

The Gateway board requires 24VAC power from a Class 2 *center-tapped* transformer.

Emerson Retail Solutions supplies several sizes of center-tapped transformers for powering multiple 16AIs, 8ROs, and other RS485 peripheral boards of the E2, Einstein, and REFLECS systems.

Refer to your controller's user manual for information on how to use the center-tapped transformers listed in ***Table 4-2*** to power multiple RS485 I/O devices.

Figure 4-7 shows how to connect the 56VA and 80VA transformers to the Gateway power connector.

	Three-Board	Six-Board
P/N	640-0056	640-0080
Power Rating	56 VA	80 VA

Table 4-2 *- Power Ratings for Emerson Retail Solutions Transformers*

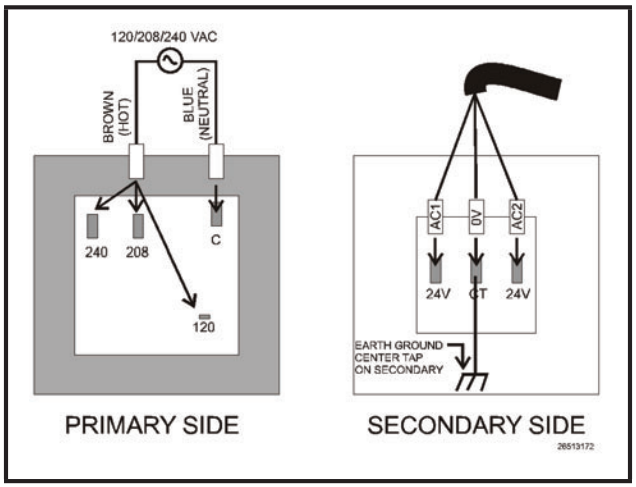


Figure 4-7 *- Pinout for the 56VA (640-0056) and 80VA (640-0080) Transformers*

4.2.2. Gateway Board Networking

To connect the Gateway to an RLDS, punch out one of the remaining service knockouts to gain access to the interior of the RLDS monitor. Locate the RS485 connector and remove it from the circuit board. Secure the wire leads to the connector orienting them as shown in ***Figure 4-8***. When you are through securing the connections, carefully plug the connector back onto the circuit board.

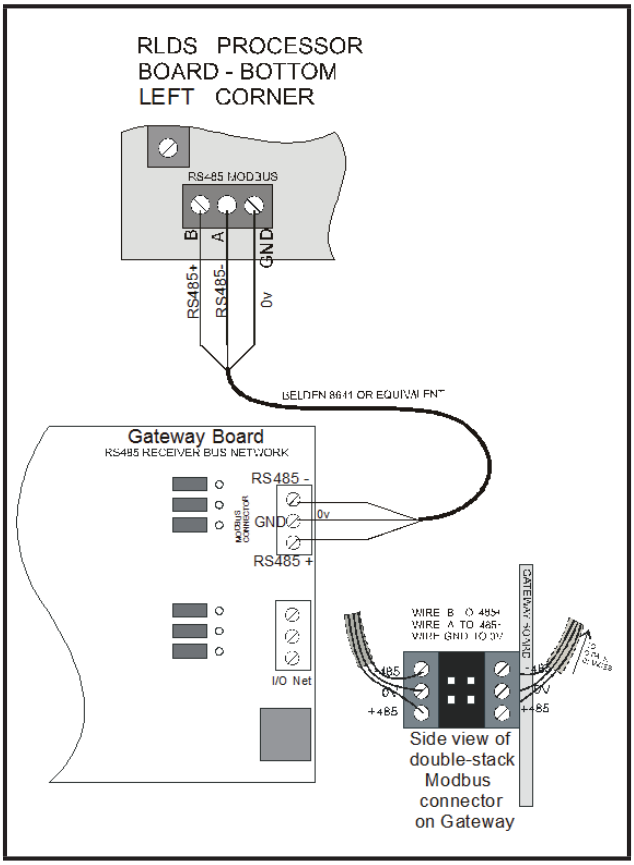


Figure 4-8 *- RLDS and Gateway Board Wiring*

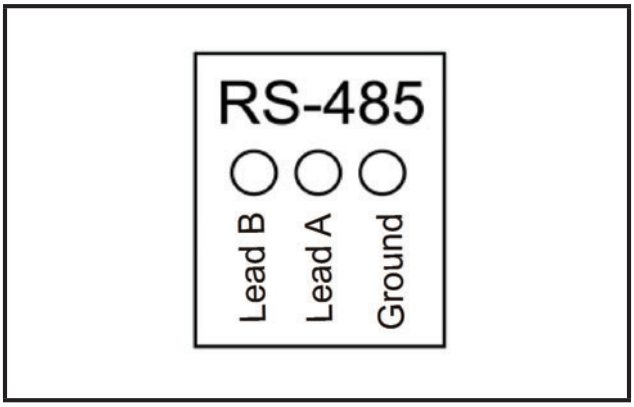


Figure 4-9 *- RS485 Connector - RLDS*

4.2.2.1. Changing Terminator Switch Settings

The terminator switch is shipped from the factory in the terminated or DOWN position. This is the correct setting if the RLDS is connected to a single device, or it is the last device on the network chain. If the RLDS is to be installed in the middle of a network, the terminator must be moved to the UP position. Locate switch 4 and determine its position. If it needs to be moved, slide the switch to the appropriate position.

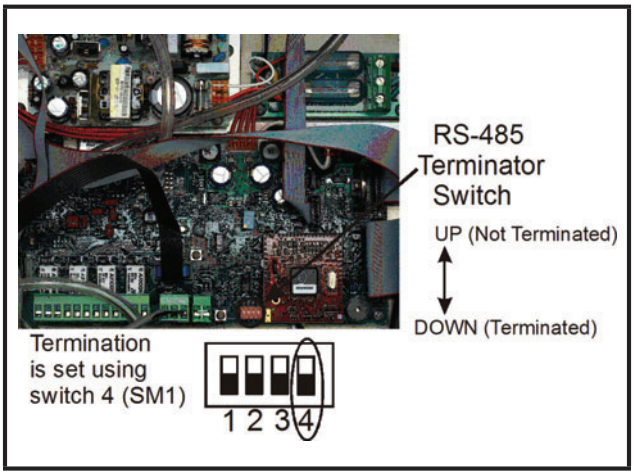


Figure 4-10 *- Positioning the Termination Switch - RLDS*

4.2.2.2. RLDS Node Address

The node address is set through the front display of the RLDS unit. Refer to **Section 7.16.,** *Node Address* for more information.

NOTE: If connecting RLDS units to a Emerson Retail Solutions site controller network, you MUST number the units from 1-3. The Gateway Board will not recognize any RLDS unit with a number that is not 1, 2, or 3.

4.2.3. Connecting to an E2, Einstein, or REFLECS Site Controller

Up to three RLDS units may be connected to a site controller via the Gateway Board. The node address switch on each RLDS must be set in succession from 1 to 3 in order for the Gateway Board to recognize the units on the network.

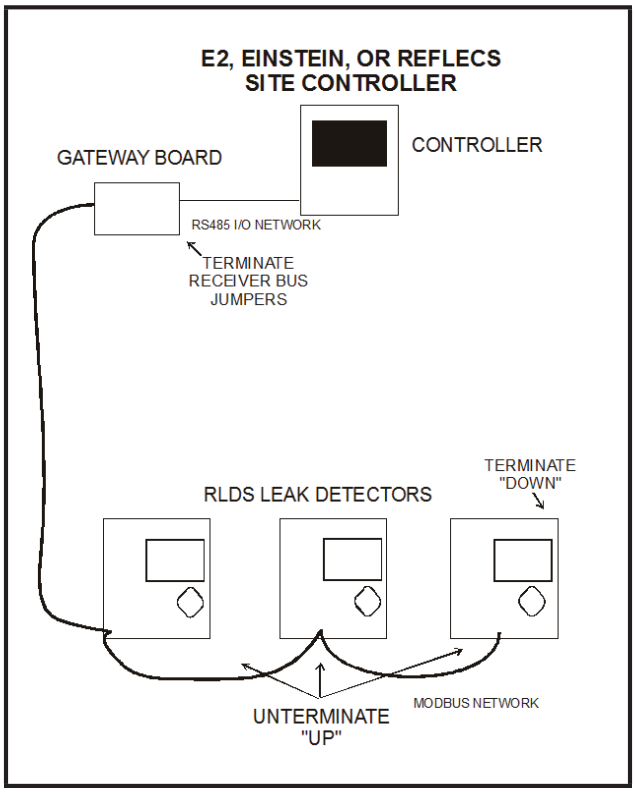


Figure 4-11 *- RLDS Units Connected to Gateway, Site Controller*

Termination

The three RLDS units and the Gateway Board are connected serially via MODBUS. If an RLDS is at the end of the network segment, terminate the unit by setting the termination switch to the DOWN position. Otherwise, set the termination switch to the UP position to leave the unit unterminated.

If the Gateway Board is at the end of a network, the Gateway Board's "Receiver Bus" termination jumpers must be set to the "termination" position ***(Figure 4-12)***. Otherwise, the jumpers should be set to the "no termination" position.

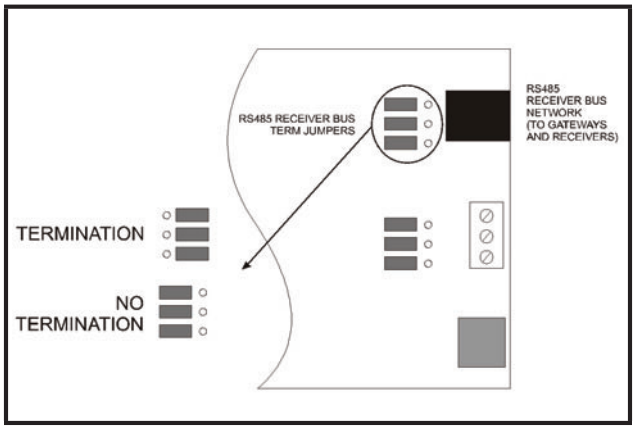


Figure 4-12 *- Gateway Board Termination Jumpers*

Network Wiring

For network wiring, use Belden #8762 or #8641 cable or equivalent. The total length of network cable in this configuration may not exceed 4921 feet (1499 meters).

4.2.4. Connecting the Gateway Board to the E2, Einstein, or REFLECS Network

Each E2, Einstein, or REFLECS site controller that will communicate with one or more RLDS must have a Gateway Board installed on its RS485 I/O Network. For E2 and Einstein controllers, this means the Gateway will be installed on the RS485 I/O Network; for RMCC, BEC, BCU, and other REFLECS products, the Gateway will be installed on the COM A or COM D network.

4.2.4.1. Wire Connection

Using shielded three-conductor network cable (Belden #8641 or equivalent), connect the RS485 I/O Network wire to the three-terminal connector on the Gateway board as shown in ***Figure 4-13***. For further information about how RS485 networks are configured, refer to your site controller's user manual.

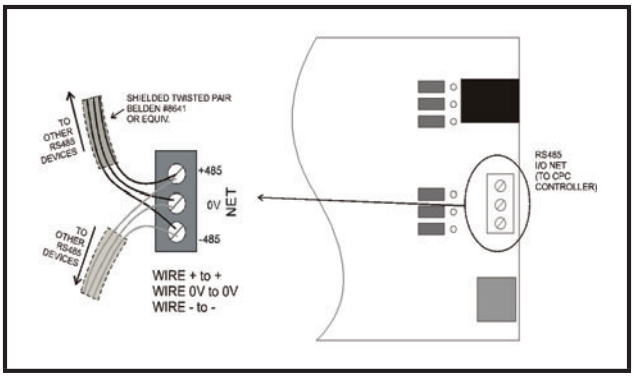


Figure 4-13 *- Connecting the Gateway to the RS485 Network*

4.2.4.2. Setting the Board Numbering Dip Switch

The first step is to determine whether the RLDS Gateway should emulate 16AI boards – known as the REFLECS mode, or if the RLDS Gateway should emulate IRLDS units in Einstein/E2 – known as the Einstein mode. When dip switch 8 is in the ON position it selects the REFLECS mode, and when dip switch 8 is in the OFF position it selects the Einstein mode.

REFLECS Mode

In the REFLECS mode the Gateway board responds as a series of three 16AI Analog Input boards numbered in succession. Addressing the "boards" represented by the Gateway is achieved by setting dip switches 1 through 4 to the first board number to be used. When this number is set, the Gateway will also use the next two board numbers above the first board number. For example, if a Gateway dip switch is set to board number 3, the Gateway will use board numbers 3, 4, and 5 on the I/O Network.

Once the RLDS Gateway has been added to the network, the *I/O Board Device Numbers* screen in REFLECS (from the REFLECS Home screen press **7**,**7**,**2**) will also need to be adjusted to show the correct number of input boards. This number should be the total number of input boards plus the number of RLDS units.

Since the RLDS Gateway can support up to three (3) RLDS units, the first RLDS unit maps to the first RLDS Gateway address, and the second RLDS unit maps to the second RLDS Gateway address; therefore, if the RLDS Gateway address = 3, then RLDS unit #1 will appear on 16AI #3 and so forth.

If you are not using all three RLDS units, you can disable them on the Gateway (see **Section 11.2.,** *RLDS Enable Screen*). If they are disabled on the RLDS Gateway, then the corresponding addresses are free to be used by other 16AI boards.

Note that because the Gateway reserves three 16AI Board numbers for its own use, an I/O Network with a Gateway is limited to thirteen (13) 16AI boards. Note also that since 16 is the highest board number possible, a Gateway's dip switch may not be set to any number above 14.

Einstein Mode

In the Einstein mode the Gateway board responds as a series of three IRLDS units numbered in succession. Addressing the "boards" represented by the Gateway is achieved by setting dip switches 1 through 4 to the first unit number to be used. When this number is set, the Gateway will also use the next two board numbers above the first board number. For example, if a Gateway dip switch is set to board number 4, the Gateway will use IRLDS numbers 4, 5, and 6. Once the RLDS Gateway has been added to the network, the *Connected I/O Boards and Controllers* screen in E2 (from the E2 Main Menu press **7**,**7**,**2**) will also need to be adjusted to show the correct number of IRLDS units. This number should be the total number of RLDS, IRLDS II, and MRLDS (up to 16 can be mapped to one IRLDS) units being used on that Einstein/E2.

Since the RLDS Gateway can support up to three (3) RLDS units, the first RLDS unit maps to the first RLDS Gateway address, and the second RLDS unit maps to the second RLDS Gateway address; therefore, if the RLDS Gateway address = 4, then RLDS unit #1 will appear on IRLDS #4 and so forth.

If you are not using all three RLDS units, you can disable them on the Gateway (see **Section 11.2.,** *RLDS Enable Screen*). If they are disabled on the RLDS Gateway, then the corresponding addresses are free to be used by other Gateways mapping in other RLDS, IRLDS II, or MRLDS units.

For example, if you had an IRLDS II Gateway with two IRLDS II units, and an RLDS Gateway with one RLDS, then you could set the IRLDS II for address 1 and disable the third IRLDS II unit on the Gateway. Then set the RLDS Gateway for address 3 and disable the second and third RLDS units on this Gateway. In E2 you would select three IRLDS controllers. IRLDS units 1 and 2 would map to the IRLDS II Gateway and the third IRLDS would map to the RLDS on the RLDS Gateway.

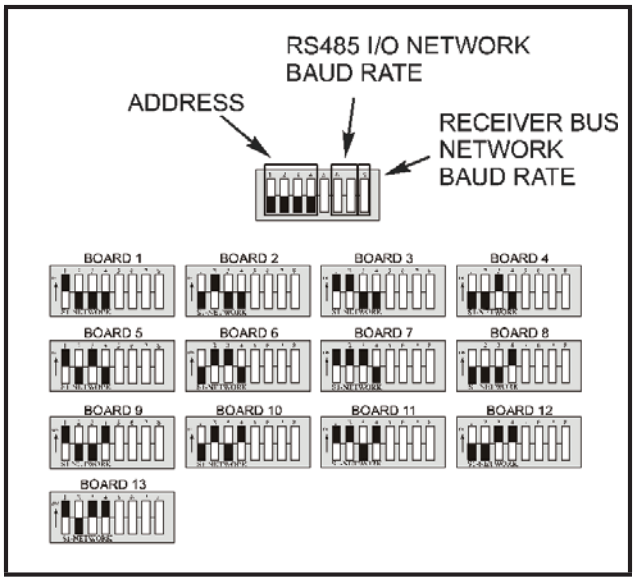


Figure 4-14 *- Gateway Dip Switch Numbering*

4.2.4.3. Setting the Baud Rate Dip Switches

Dip switches 6 and 7 control the baud rate at which the Gateway communicates with the site controller on the RS485 Network. These switches must be set to the same baud rate setting as the E2, Einstein, or REFLECS (usually 9600 baud). All Gateways and RLDS units on the network must have the same baud rate dip switch setting.

Dip switch 8 must be set to the ON position for REFLECS controller mode and OFF for E2, Einstein controller mode.

Baud rate for the RLDS is set by software, either through the RLDS, or on the Gateway Board via Hand-Held Terminal. It is recommended you use 19200 baud as the MODBUS Network baud rate, as it is the default baud rate used by the RLDS. Set dip switch 5 to OFF.

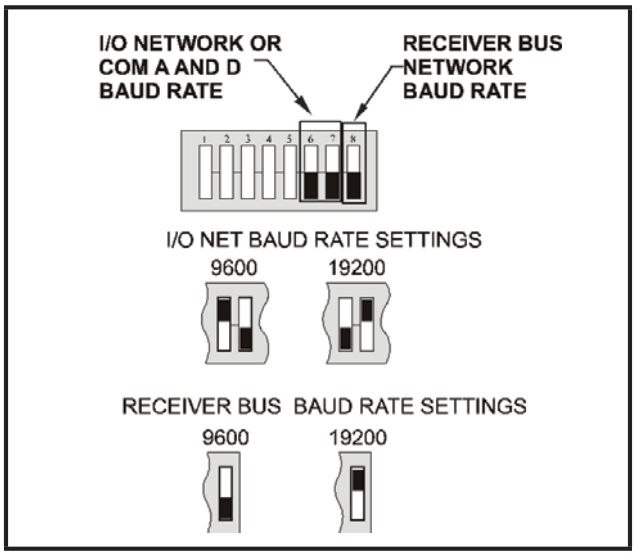


Figure 4-15 *- Dip Switch Setting for Numbering Gateway*

4.2.4.4. Setting the RS485 I/O Termination Jumpers

As part of an area controller's RS485 I/O (COM A or COM D) Network, a Gateway must be terminated if it is the end device of a daisy chain. Refer to the controller's user manual for information about daisy chain networks and how they are terminated.

To terminate the Gateway, set the I/O Network Jumpers to the right position as shown in ***Figure 4-16***. To un-terminate the Gateway, set the jumpers to the left position.

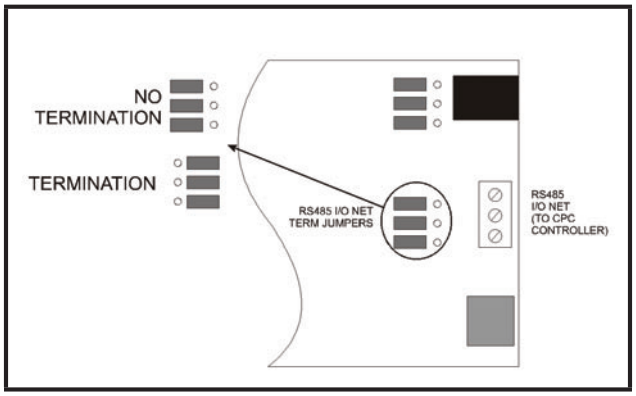


Figure 4-16 *- Gateway RS485 I/O Network Termination*

4.2.5. Gateway Board Status LEDs

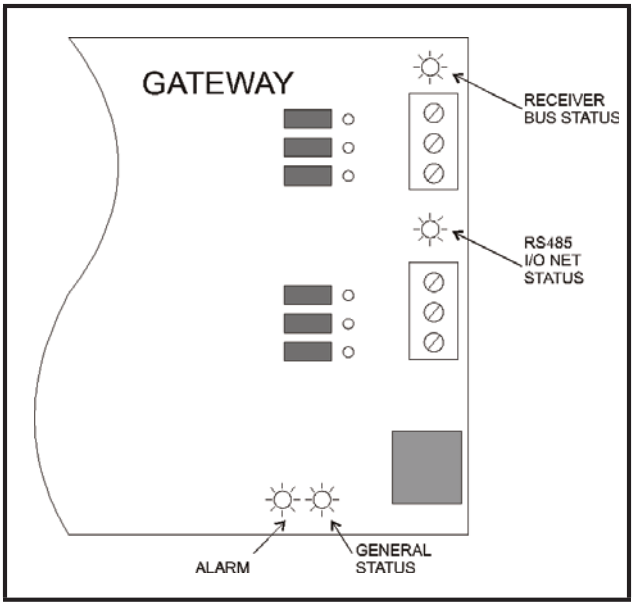


Figure 4-17 *- Gateway LED Locations*

The Gateway has four LEDs: a General Status LED, an Alarm LED, an RS485 I/O Net Status LED, and a Receiver Bus Status LED (***Figure 4-17***).

4.2.5.1. The General Status LED

The General Status LED light flashes green once every second to indicate it is powered up.

4.2.5.2. The Alarm LED

The Alarm LED (red) indicates when an alarm condition exists for the Gateway. There are five possible LED states, each of which indicates a different condition.

- ***OFF*** - No alarm conditions are active, and the Gateway is functioning normally.
- ***Flashes 4 times/second*** - There is a problem with the physical hardware (ROM) of the Gateway board. The board may need to be replaced.
- ***Flashes 2 times/second*** - There is no user configuration on this Gateway, no RLDS units are commissioned in its memory, and it is essentially in an empty state. This LED state will occur when the board is first powered up on-site.
- ***Flashes 1 time/second*** - The Gateway is not communicating with the area controller due to a possible RS485 I/O Network or controller failure.
- ***ON with no flashing (steady)*** - One or more of

the RLDS units is offline. If all are offline, check the wiring. If just one is offline, check the RLDS controller.

4.2.5.3. RS485 I/O Network Status LED

The RS485 I/O Network Status LED flashes orange to indicate traffic on the I/O Network (between the Gateway and the site controller). If this light does not come on at all and the Alarm LED is flashing once per second, there is a problem with the RS485 I/O Network or the area controller.

4.2.5.4. Receiver Bus Network Status LED

The Receiver Bus Network Status LED blinks orange each time the RLDS Gateway sends a message on MODBUS. However, when the Gateway receives a message from the RLDS units, the LED will flash brightly for 1/2 second.

If the Gateway has RLDS configurations in memory and is communicating properly, you should see this LED flash brightly several times within the course of a few minutes.

5 RLDS - Connecting External Alarms

5.1. Overview

Each RLDS includes four (4) Form C, SPDT relays. The contacts are rated .5A at 250 VAC and 1.0A at 30 VAC. These relays are used for the connection of external alarm devices. The relays are factory-assigned to the following conditions:

Relay #1	Leak
Relay #2	Spill
Relay #3	Evacuate
Relay #4	Fault

5.2. Connection

Use the AC conduit or any of the remaining service knockouts to gain cable access to the interior of the monitor. Locate the relay connector (***Figure 3-9***) and remove it from the circuit board.

1. Secure the leads to the connector orienting them as shown in ***Figure 5-1***. Wire the leads to either the N.C. or N.O. terminals of each relay, depending on whether you want the relay to be CLOSED or OPEN when de-energized.
2. When you are through securing the connections, carefully plug the connector back onto the circuit board.

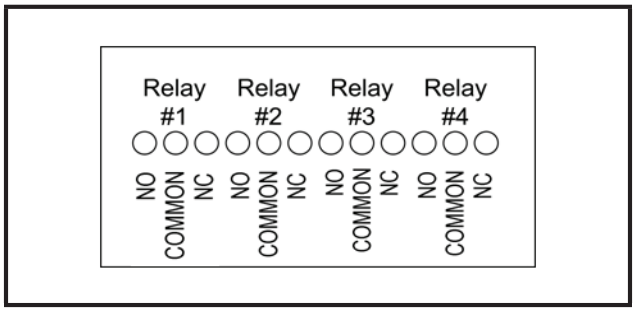


Figure 5-1 *- RLDS Relay Connector*

NOTE: Each relay may be connected as normally open (NO), or normally closed (NC).

The relay contacts are rated .5 A at 250 VAC.

Latching / Non-Latching - refer to **Section 7.7.,** *Alarm Acknowledge (Ack) - Mode* to select Alarm Ack Mode.

Alarm power source - power for the alarm devices connected to the relay contacts may be supplied from the Auxiliary AC Power Out Connector (***Figure 3-8***).

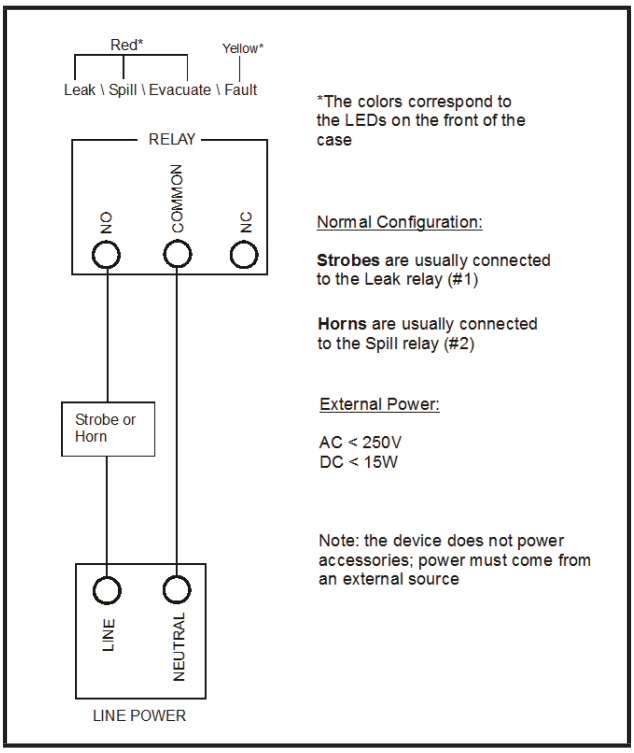


Figure 5-2 *- RLDS Relay 1 and 2 Wiring*

3. Jumper the **Neutral** of the input power connector to the **Common** on the relay block.
4. Connect one end of strobe or horn to the **NO** of whichever level of alarm is appropriate for application.
5. The other end of strobe or horn is connected to the **Line** of the input power connector (5 A maximum).

6 RLDS Hardware Specifications

Hardware Specifications	
Product Type	Multiple refrigerant gases and multiple area monitoring system for low level continuous monitoring of CFC, HCFC, and HFC refrigerant gases used in most commercial refrigeration systems. System design supports compliance to the refrigerant monitoring requirements of ANS/BSR ASHRE 15-2007 and ASHRAE Safety Code 34-2007.
Coverage	4-point standard, expandable to 16 points in 4-point increments
Detector Type	Infrared Non-Dispersive
Gas Library: CFC: HFC: HCFC: HALON: <u>Other</u>:	 R-11, R-12, R-113, R-114, R-502, HFP R-404a (HP62), R-407a, R-407c (AC9000), R-134a, R-410a (AZ20), R-507 (AZ50), R-508b (SUVA95), R236FA, R125, R245Fa, R422d, R427a R-22, R-123, R-124, R-500, R-503, R-401a (MP39), R-402a (HP80), R-402b (HP81), R-408a, R-409a, R-23, R-21, R227 H1301, H2402, H1211 FA188, FC72, N1230, HFO1234YF, R424A, R426A, R427A, R427a, R438A
Sensitivity	All gases 1 PPM
Measuring Range	All gases 0 to 10,000 PPM
Accuracy	±1PPM ±10% of reading from 0-1000 PPM (R11, R22, and R113 ±10 ppm ±15% of reading 0-1000 ppm)
Front Panel	3 Indicator lights: • Green = Monitor is powered on. LED glows during normal operation; flashes when unit is in warm-up mode • Red = Alarm. LED flashes when any point has exceeded the alarm setting • Yellow = Fault. LED flashes when there is a system fault
Size/Weight	12.23”H x 13.7”W x 4.96”D (31.06 cm x 34.80 cm x 12.60 cm) / 15 lbs.
Temperature Drift	±0.3% of reading per degrees C
Sampling Mode	Automatic or manual (hold)
Re-Zero	Auto or on zone change
Response Time	5 to 315 seconds – depending on air line length and number of zones
System Noise	Less than 40dB(A) @ 10 feet (3 meters)
Monitoring Distance	1200 ft. (365 meters) maximum for combined length of sample + exhaust tubing (each zone)
Conditioned Signal	Dual optional 4-20mAdc isolated outputs. Channel 1 = zone area, Channel 2 = PPM

Table 6-1 *- RLDS Specifications*

Hardware Specifications	
Alarms	Four SPDT alarm contacts rated 2A at 250 VAC (inductive) 5 A at 250 VAC (resistive). Three are assigned to PPM level alarms, one assigned to system faults.
Communications	Full two-way communication with Building Management System via RS-485 serial interface. RS-232C communication port standard.
Power Safety Mode	Fully automatic system reset. All programmed parameters retained.
Operating Temp	32°F to 122°F (0°C to 50°C)
Ambient Humidity	5% to 90% RH (non-condensing)
AC Power	100 to 240 VAC, 50/60 Hz, 20 W
Certification	UL 61010-1, CAN/CSA 22.2 No. 61010 & CE Mark
Warranty	2 years from date of shipment
Altitude Limit	6,562 ft (2,000 m)

***Table 6-1** - RLDS Specifications*

RLDS-CO_2 Hardware Specifications	
Product Type	The RLDS-CO_2 provides multiple area monitoring for low level continuous monitoring of carbon dioxide gases used in most commercial systems. System design supports compliance to the gas monitoring requirements of ANS/BSR ASHRE 15-1994.
Gas Library:	Carbon Dioxide (CO_2)/R-744
Sensitivity	10 ppm
Measuring Range	300-8,000 ppm
Accuracy	±5 PPM ±5% of reading from 300-1000 ppm, ±10% of reading from 1001-3000 ppm (At reference environmental conditions 25°C, 45% RH non-condensing, 1 ATM)

***Table 6-2** - RLDS-CO_2 Specifications*

7 Programming Setup and UI Navigation for RLDS - Display Screens

7.1. Navigation Keys

- Use the arrow/cursor keys for multi-directional movement in making selections and moving the cursor.
- Use the **ENTER** key to initiate and complete a selection.
- Use the **ESC** key to go back during programming or silence an alarm in alarm mode.

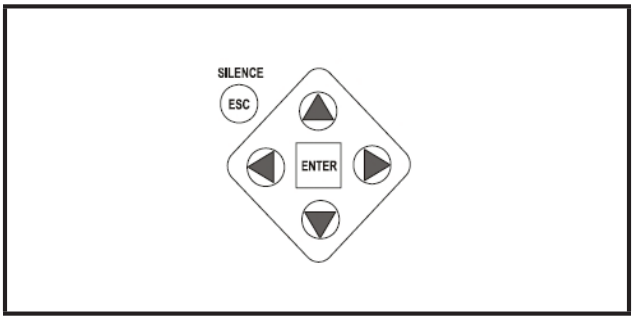


Figure 7-1 *- RLDS Front Panel Navigation Keys*

7.2. Initial Power Up

When the RLDS is first powered up, all front level panel LEDs will illuminate, and a splash screen will appear and display the monitor's firmware version level. After a moment the Warm Up screen will be displayed and the green **MONITOR ON** light (green) will blink.

After a 15-minute warm-up cycle, the **MONITOR ON** light will glow steadily and the *Status screen* will be displayed:

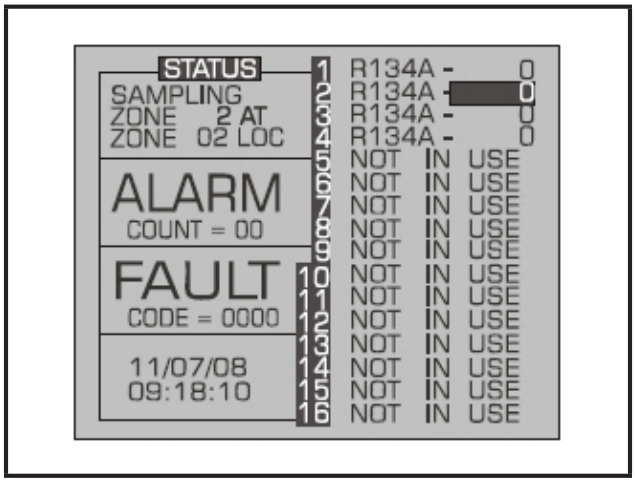


Figure 7-2 *- Status Screen*

NOTE: "RLDS Setup Screens - System Map" on page 41

7.3. Navigate to the First Setup Screen

1. Use the up/down cursor keys to select the first text box to access the *Setup screen*.
2. Press **ENTER** to select.

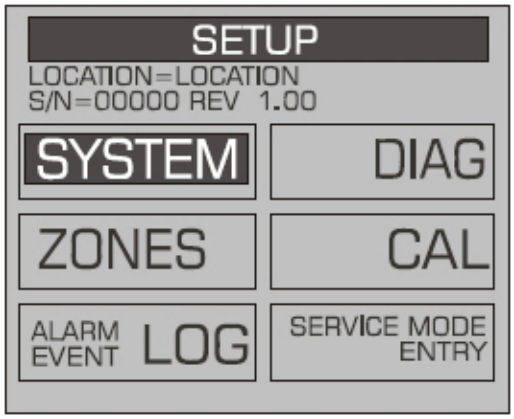


Figure 7-3 *- Setup Screen 1*

7.4. Navigate to the Second Setup Screen

1. From RLDS *System Setup screen 1* select the **SYSTEM** option to go to *System Setup screen 2*.
2. Press the **ESC** key to return to the *System Setup screen 1*.

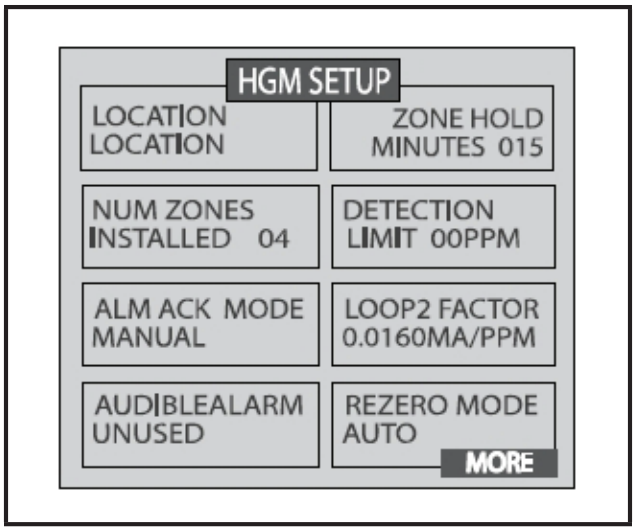


Figure 7-4 *- Setup Screen 2*

7.5. Location

This is the name you assign to the RLDS to identify its location. It may have up to 12 alphanumeric characters.

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.6. Number of Zones Installed

Number of Zones Installed is the number of zones from 1 to 16 connected to the instrument.

IMPORTANT: **DO NOT** change the number of zones to deactivate unused zones. Changing the number of installed zones is only necessary when manifold blocks are added or removed. Go to the individual zone that you wish to disable and set its distance to zero.

1. Press the **ENTER** key to adjust the number.
2. Use the up/down cursor keys to modify the number. Press **ENTER** to accept the new number or **ESC** to revert to the previous setting.

NOTE: The RLDS auto setting detects the number of zones present on power-up. Do not plug any zones. The number detected on power-up is the default value for this parameter.

7.7. Alarm Acknowledge (Ack) - Mode

This function programs the relays in the RLDS unit for latching or non-latching operation.

1. Press the **ENTER** key to adjust the setting.
2. Use the up/down cursor keys to toggle between settings.

AUTO - Non-latching (Alarm relay will automatically de-energize when the gas level drops below its alarm point).

MANUAL - Latching (Alarm relay remains energized, and will not release until the alarm condition has been manually acknowledged). Refer to ***Section 8.6.4.,*** *Acknowledging Alarms*.

3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.8. Audible Alarm

This parameter selects the function of the RLDS unit's internal audible alarm device.

1. Press the **ENTER** key to adjust the setting.
2. Use the up/down cursor keys to select **unused**, **monitor on**, **evacuate**, **spill**, **leak**, **fault**, or **alarm**.
3. Press **ENTER** to accept the new entry or select **ESC** to revert to the previous setting.

7.9. Zone Hold Mode

A zone can be placed on hold and continuously monitored for a length of time determined by the Zone Hold Time value. To place a zone on hold:

1. Select the zone at the top level screen.
2. Press and hold down the **ENTER** key until the unit beeps. The word **HOLDING** will appear in the status box.
3. While in the hold mode, further investigation of the zone's status can be made by navigating to that zone's *Setup Screen 1*.
4. To release the zone from the Hold Mode, press and hold down the **ENTER** key until the unit beeps and the screen display returns to normal.

7.10. Zone Hold Time

Sets the length of time a zone will be monitored when the Zone Hold feature is activated. The default is 15 minutes. The range is 1 to 999 minutes.

1. Press the **ENTER** key to adjust this setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual numbers.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.11. Detection Limit

Detection Limit is a squelch setting that instructs the instrument to interpret PPM readings below the designated level as 0. The range is 1 to 99 PPM.

1. Press the **ENTER** key to adjust the setting.
2. Use the up/down cursor keys to modify the setting.
3. Press **ENTER** to accept the new entry or select **ESC** to revert to the previous setting.

7.12. Loop2 Factor

Loop2 Factor sets the PPM scale factor for current loop number 2. To calculate the current output, multiply the scale factor by the PPM and add four (4). For example, at the default scale factor of 0.016, a measurement of 100 PPM would generate a current output of 5.6 mAdc. The current output cannot exceed the 20 mAdc capacity of the interface.

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or select **ESC** to revert to the previous setting.

7.13. Re-Zero Mode

This parameter defines the frequency at which the instrument re-zeros the optical sensor.

1. Press the **ENTER** key to adjust the setting.
2. Use the up/down cursor keys to toggle between settings.

AUTO - sets the instrument to re-zero every 10 minutes.

ZONE CHANGE - sets the instrument to re-zero at each zone change. This is the most accurate setting, but increases the time interval between measurement cycles.

3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.14. Navigating to the Third Setup Screen

From the second *System Setup screen*, select the **MORE** option to go to the *System Setup screen 3*. Select the **BACK** option to return to the *System Setup screen 2*.

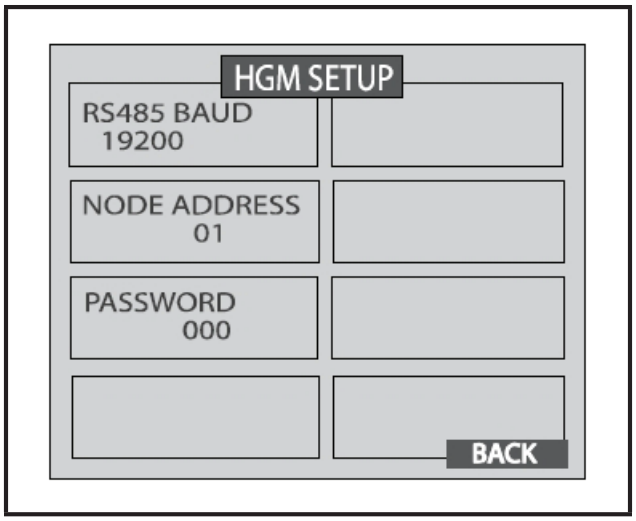


Figure 7-5 *- Setup Screen 3*

7.15. Service Timeout

NOTE: The RS485 BAUD rate text will be replaced by "Service Timeout" when in Service Mode.

Displayed in Service Mode, Service Timeout sets the length of time the Service Mode is in effect and stops the monitor for up to 300 minutes (5 hrs) to allow for servicing the unit.

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual numbers.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.16. Node Address

Each RLDS on the network must have a distinct node address. The node address may be set from 1 to 64.

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual numbers.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.17. Password

This field is used to define a system password. The default setting is **000**, which provides no password protection.

1. Press the **ENTER** key to adjust the password.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual alphanumeric characters.
3. Press **ENTER** to accept the new password or **ESC** to revert to the previous setting.

7.18. Accessing Additional Features

Several additional features can be viewed on the *System Setup screen 3* when the RLDS is placed in Service Mode (refer to ***Section 8.11.,*** *Service Mode*). While in service mode, the user can identify the model number, set digipot values and sensor temperature, and acquire the temperature coefficient.

7.19. DET Digipot

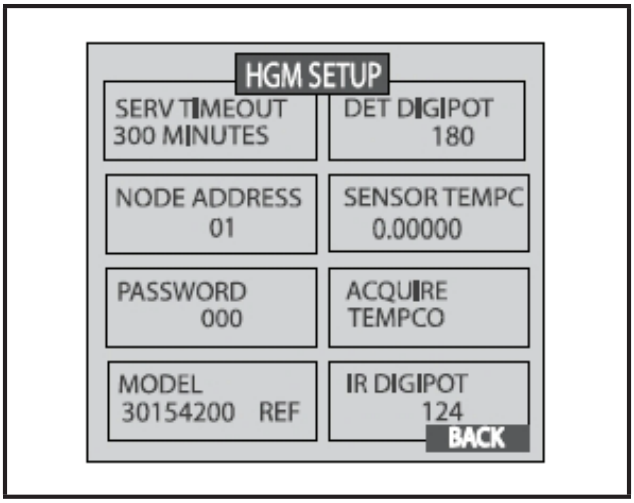


Figure 7-6 *- System Setup Screen 3 - Service Mode*

The DIGIPOT function allows a manual and more precise adjustment of the digital potentiometer, which controls the voltage of the IR Detector. The DIGIPOT is auto-tuned at every power up.

1. Press the **ENTER** key to adjust the setting. Once the option is selected the screen will also display the voltage.
2. Use the up/down cursor key to modify the Digipot value.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.20. Sensor Temperature Coefficient

1. Press the **ENTER** key to adjust the setting.
2. Use the up/down cursor key to modify the temperature value.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

7.21. Acquiring Temperature Coefficient (Factory Use Only)

Press the left/right arrow buttons simultaneously to return to the previous screen.

7.22. R Digipot

This option will indicate the electrical parameters of the infrared emitter.

8 General Operation of RLDS - UI

8.1. Functional Overview

Normally each RLDS will perform measurements on its active zones sequentially and without user input. The total time it takes an RLDS to complete a measurement cycle is directly proportional to the number of active zones and the physical length of the air lines. Monitors linked together on a network operate independently of each other and consequently complete their respective measurement cycles at different rates.

8.2. The Zone Screen

From the *System Setup screen 1 (**Figure 7-3**)*, scroll down and select the **ZONES** option (or select the desired zone from the *Status screen (**Figure 7-2**)*.

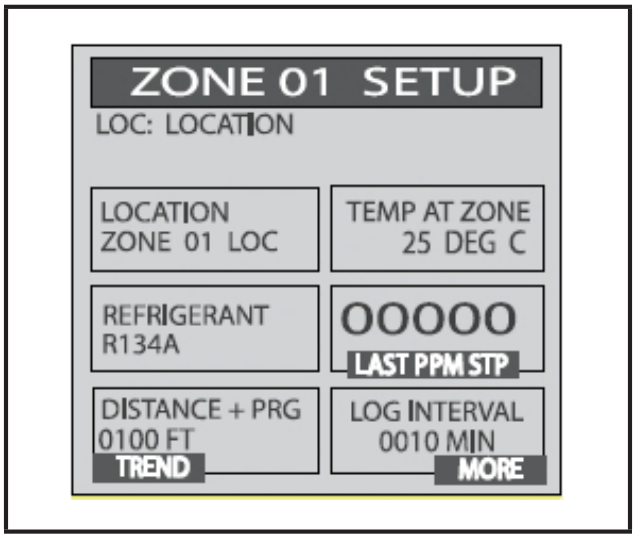


***Figure 8-1** - Zone Setup Screen 1*

8.2.1. Location

This is the name you assign to the RLDS to identify its location. It may have up to 12 alphanumeric characters.

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

8.2.2. Refrigerant Type

This displays the kind of refrigerant the RLDS is detecting.

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to select the type of refrigerant you want the device to detect.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

8.2.3. Distance

This displays the combined length of the sample tubing plus any tubing on the exhaust port. Total length should not exceed 1200 feet (365 meters).

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

8.2.4. Zone Temperature

This displays the air temperature at the zone being sampled.

1. Press the **ENTER** key to adjust the setting.
2. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual characters.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

8.2.5. Current Detection Reading

This reading displays the current PPM STP level of the selected refrigerant being detected by the device.

8.2.6. Log Interval

The RLDS retains a data log of 100 measurements for each zone. The log interval is the number of minutes from 1 to 1440 between each log point. This parameter can be changed from *Zone Setup screen 1* (***Figure 8-1***).

The default setting for this parameter is **1440** minutes (24 hours). If the log interval time is set to **0**, then a measurement is recorded in the trend log after *every measurement cycle*. Therefore, after the trend log is filled, it will contain the last 100 measurement points for a zone. If you want the data logged less frequently, increase this value.

It is important to remember that cycle time is dependent on many factors, including the number of zones being monitored, input line length, and the run zeroing mode selected. Before changing this value it may be useful to review the log data first using the *Trend screen* to determine the nominal cycle time.

8.3. Navigating to the Second Home Screen

Select the **MORE** option at the bottom right hand side of the screen (***Figure 8-1***) to continue to the next screen containing more options. This screen displays the peak PPM value in the upper side of the screen.

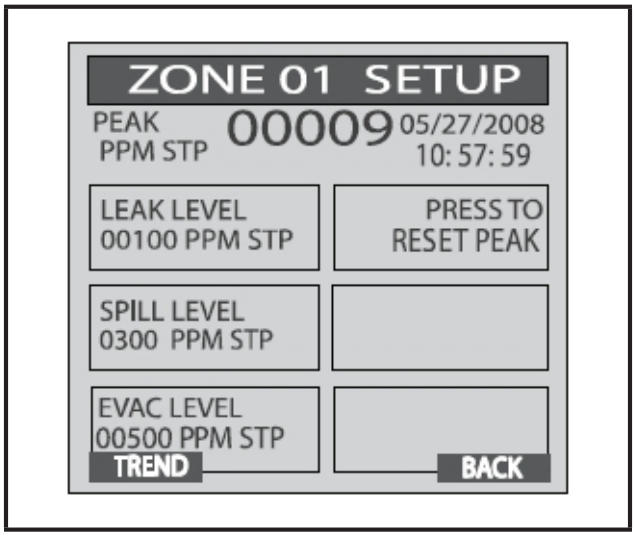


Figure 8-2 *- Zone Setup Screen 2*

8.3.1. Leak Level

This is the concentration level in PPM that will activate a leak alarm condition.

1. Press the **ENTER** key to adjust the value.
2. Use the up/down cursor keys to modify the setting.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

NOTE: This value must be less than the spill level.

8.3.2. Spill Level

This is the concentration level in PPM that will activate a spill alarm condition.

1. Press the **ENTER** key to adjust the value.
2. Use the up/down cursor keys to modify the setting.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

NOTE: This value must be less than the evacuate level and greater than the leak level.

8.3.3. Evacuation Level

This is the concentration level in PPM that will activate an evacuate alarm condition.

1. Press the **ENTER** key to adjust the value.
2. Use the up/down cursor keys to modify the setting.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

NOTE: This value must be greater than the spill level.

8.3.4. Resetting the Peak PPM Value

Pressing this key resets the current peak PPM level stored in memory and displays it at the top of the screen.

8.4. Alarm Conditions

When an alarm condition is detected anywhere on the network, the red **ALARM** LED will glow on the front of the unit. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (***Section 4.2.,*** *E2, Einstein, and REFLECS Controllers (The RLDS Gateway Board)*.

An inverse flashing box indicates an alarm condition in the affected zone.

You can investigate the status of the affected zone further by selecting the **ALARM** option on the *Status screen* (***Figure 7-2***).

8.5. Fault Conditions

If a system malfunction occurs, the yellow **FAULT** LED will glow. Additionally, an external alarm (***Section 4.2.,*** *E2, Einstein, and REFLECS Controllers (The RLDS Gateway Board)* device may activate and an audible alarm may sound if those features have been enabled (***Section 7.8.,*** *Audible Alarm*).

8.6. Alarms

8.6.1. Functional Overview

If the PPM level for any zone exceeds its designated spill, leak, or evacuate thresholds, an alarm condition will be created. Once the RLDS completes a measurement cycle in the affected zone the alarm condition will be indicated. At that time the red **ALARM** LED on the RLDS will glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (***Section 7.8.,*** *Audible Alarm*).

The alarm condition may or may not have to be acknowledged for the system to return to normal operation.

8.6.2. Responding to Alarms

An operator can respond to alarms by accessing the *Alarm Summary screen*. Navigate to this screen by selecting **ALARM** on the *Status screen 1* (***Figure 7-2***).

Alarm Summary Screen

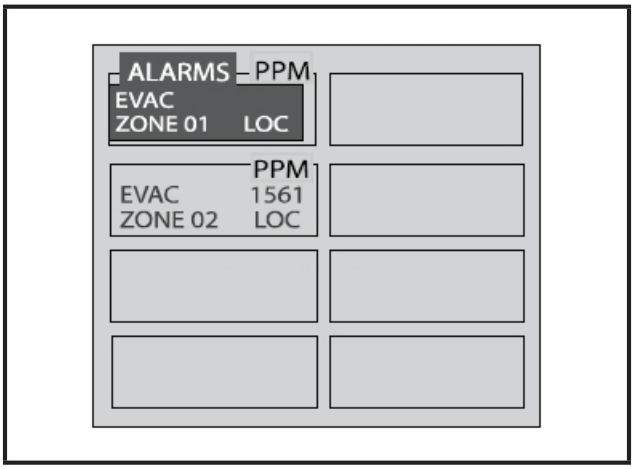


Figure 8-3 *- Alarm Summary Screen*

The *Alarm Summary screen* displays a list of all alarm conditions pending across the network. The screen is divided into eight (8) boxes, and each box represents a single alarm. If more than eight (8) alarms are pending, additional pages can be displayed by selecting the **MORE** option (visible when there are more than eight (8) alarms pending).

Each box displays the zone number, zone name, and the current PPM reading. A flashing box indicates an alarm that has not been acknowledged. A static box represents an alarm that has been acknowledged but has not yet been cleared from the system.

The Alarm Data Log can be reset by pressing a combination of the **ENTER** and right arrow buttons while viewing the log.

8.6.3. Alarm Detail Screen

The *Alarm Detail screen* displays more comprehensive information about the nature of the alarm including:

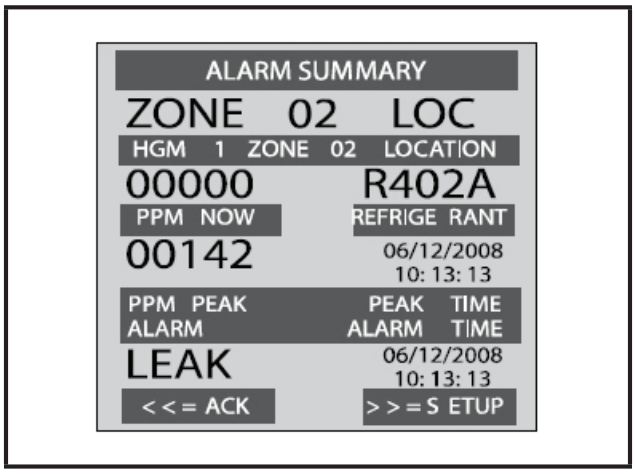


Figure 8-4 *- Alarm Detail Screen*

- Complete location information
- Gas type and current concentration (CONC NOW)
- Peak concentration and peak time
- Type of alarm, alarm time, and date

This screen provides the following navigation options at the bottom of the display:

- **ACK** - using the left arrow key, ACK will acknowledge the alarm as described in the next section.
- **SETUP** - using the right arrow key, navigate to the *Zone Setup screen 1* (***Figure 8-1***). This enables review of the zone setup parameters and accesses the *Trend screen*.

Use the **ESC** button on the RLDS unit to go back to the previous menu.

8.6.4. Acknowledging Alarms

Each pending alarm may require, depending upon selected alarm mode, acknowledgment before the system returns to normal operation ***Section 7.7.,*** *Alarm Acknowledge (Ack) - Mode*. To acknowledge an alarm, navigate to the *Alarm Detail screen* and select the **ACK** option as previously described. You will then be returned to the *Alarm Summary screen* and the box associated with that alarm will no longer be blinking, indicating that the alarm has been acknowledged. Repeat this procedure to acknowledge any remaining alarms.

Alarm Summary Screen (Acknowledge Mode)

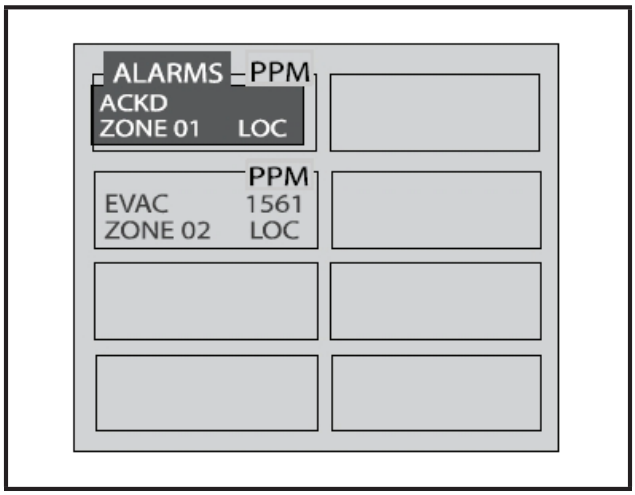


Figure 8-5 *- Alarm Summary Screen - Acknowledge Mode*

Once all the alarms associated with a given RLDS are acknowledged, its red LED will turn off, and any external alarms connected to the RLDS relays will deactivate. Keep in mind that the system will continue to generate new alarms if PPM values above the alarm thresholds are detected.

8.7. System Faults

8.7.1. Functional Overview

If a system malfunction occurs, the yellow **FAULT** LED to glow. Additionally, an external alarm device may activate and an audible alarm may sound if those features have been enabled (***Section 7.8.,*** *Audible Alarm*).

Depending on the nature of the fault, the RLDS may or may not continue to operate normally. Under a non-critical fault condition, the RLDS will continue to measure and log data, but some peripheral functions may be compromised. Under a critical fault condition, action is required for the RLDS to operate normally.

Various fault conditions are listed and explain what action should be taken to correct the problem in **Section 8.7.2.1.,** *Critical Faults*.

8.7.2. Navigating to the Fault Screen

Displayed on the initial *Status screen* (***Figure 7-2***) is a **Fault** option. Scroll down with the cursor key and select this option, and the *Fault screen* will display:

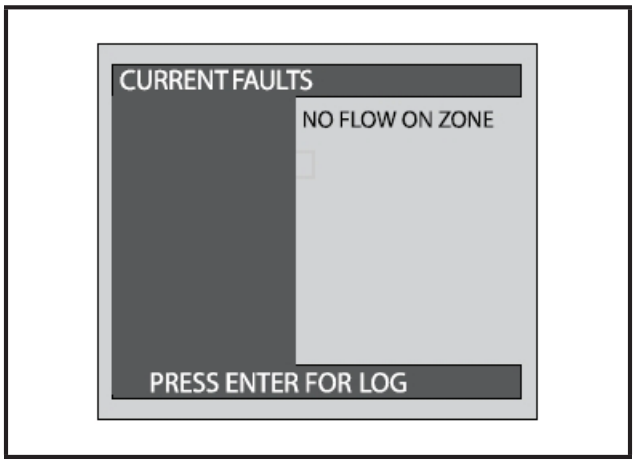


Figure 8-6 *- Fault Screen*

8.7.2.1. Critical Faults

- **NO FLOW ON ZONE** - Go to the *Status screen* (***Figure 7-2***) and select **FAULT**. This will display a ***NO FLOW*** message in each individual zone affected. Check for a blockage in the air sample line or at the line-end filter. Once the blockage has been cleared, the RLDS will return to normal operation after the zone has been sampled.

NOTE: This can take several minutes since it is dependent upon how many zones there are and their lengths. The RLDS will clear the fault the next time it polls the affected zone.

- **NO FLOW ON PURGE** - Check the purge line for a blockage. Verify that the length of the purge line and exhaust line do not exceed 500 feet (152 meters) in length.
- **NO FLOW DETECTED** - Check for proper pump operation. Examine the hydrophobic filter for contaminants or water on the input side. If the input side is gray, a contaminant is present and the filter must be replaced. To drain, remove the tubing from both sides of the filter and tap the tubing on a hard surface to dislodge the contents.
- **CLIPPING FAULT** - The detector voltage may be out of tolerance. Refer to the *Diagnostic screen* (***Figure 8-12***) for the DET voltage, AVE voltage and ZERO voltage. Contact Technical Support with this information for further instructions.
- **REZERO VOLT TOL** - The detector output voltage is out of tolerance. Refer to the *Diagnostic screen* (***Figure 8-12***) and contact Technical Support for assistance.
- **TRIGGER FAULT** - No trigger from IR source pulser. Contact Technical Support with all information from the *Diagnostic screen* (***Figure 8-12***) for further instructions.

8.7.2.2. Non-Critical Faults

- **BOX TEMP FAULT** - Enclosure's internal temperature is outside normal range (or IR sensor has failed). Check the installation to verify that the monitor is not being subjected to extreme temperatures. Verify that the ventilation holes are not obstructed. Check the *Diagnostic screen* (***Figure 8-12***) for the **ZERO** temperature, **BNCH** temperature and **BOX** temperature. Contact Technical Support with this information for further instructions.
- **BENCH TEMP FAULT** - Optical bench is outside of normal operating range (or sensor has failed). Check the installation to verify that the monitor is not being subjected to extreme temperatures. Check the *Diagnostic screen* (***Figure 8-12***) for the **ZERO** temperature, **BNCH** temperature and **BOX** temperature. Contact Technical Support with this information for further instructions.
- **PRESSURE SENSOR** - Manifold pressure is outside normal operating range (or sensor has failed). Check the *Diagnostic screen* record ALL data (***Figure 8-12***). Contact Technical Support with this information for further instructions.
- **LOOP FAULT** - This would only be displayed if the dual 4-20 mAdc option was installed and one or both current loops are open. Check the wiring to load/monitoring circuit on both 4-20 mA loops.
- **CONFIG FAULT** - There is an error in the RLDS *Setup screen 2* - **NUMBER ZONES INSTALLED** field (***Figure 7-4***). Check that the number of zones installed for each RLDS unit and the number of RLDS units on the network

are properly programmed. Check to ensure that the manifold solenoid cable connector in each RLDS unit is securely fastened to its terminal connector. Check for an illegal parameter. If necessary, reset to the factory default settings.

8.7.3. Reset to Factory Default Settings

IMPORTANT: Performing this function ERASES all program parameters, alarms, faults, trends, and log files.

8.7.3.1. Resetting the RLDS

Press and hold down the **Factory Default** switch inside the RLDS (***Figure 3-8***):

1. Cycle AC power OFF then ON
2. Listen for five beeps
3. Release the switch

Reprogram the RLDS as described in ***Section 7,*** *Programming Setup and UI Navigation for RLDS - Display Screens*.

8.7.4. Clearing System Faults

If the fault condition is associated with an RLDS, the monitor will return to normal operation soon after the problem is corrected. At that time the yellow LED will turn off and any external alarms connected to the monitor's alarm relays will also turn off.

Once the system malfunction has been corrected, it may take some time for the fault condition to clear completely. If the fault is associated with a specific zone, the RLDS must first cycle back to the affected zone before it returns to normal operation. At that time the yellow LED will turn off and any external alarms connected to the monitor's alarm relays will also turn off.

8.7.5. Viewing Fault Log

A data log of the last 20 fault conditions is retained in memory. On the *Fault screen* (***Figure 8-6***) select the **LOG** option to view a display of the Fault Log:

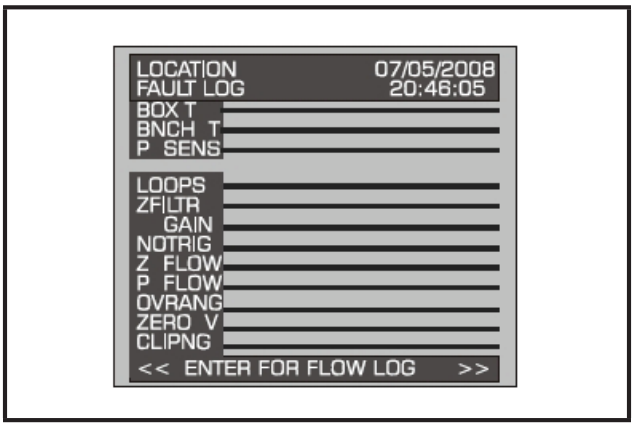


Figure 8-7 *- Fault Log Screen*

This screen lists potential fault conditions in the left column and displays a check mark indicating which problems were associated with each fault condition as represented by the vertical cursor bar. As you move the bar horizontally using the left/right cursor keys, the date and time the fault condition was detected are displayed in the upper right hand corner of the display window.

Anytime the fault status changes, there is an entry in the fault log, both when the fault occurs and when it is cleared.

The Fault Log can be reset by pressing a combination of the **ENTER** and right arrow buttons while viewing the log.

8.7.6. Viewing Flow Log

On the Fault Log screen, press **ENTER** (as shown in ***Figure 8-7***) to access the *Flow Log screen*. The Flow Log displays the last 20 flow events for all zones and the purge port.

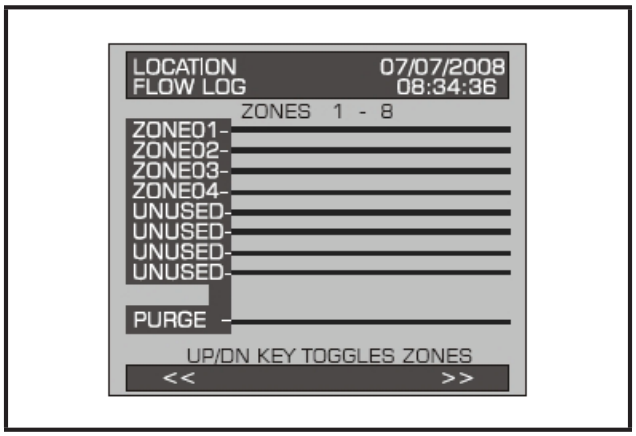


Figure 8-8 *- Flow Log Screen*

This screen lists the zones in the left column and displays flow data. Use the up/down buttons to scroll through the zones and the left/right to scroll through the log data. As you move the bar horizontally, the date and time of the condition are displayed in the upper right hand corner.

The Flow Log can be reset by pressing a combination of the **ENTER** and right arrow buttons while viewing the log.

8.8. The Trend Screen

8.8.1. Navigating to the Trend Screen

From the *Zone screen (**Figure 8-1***), select the *Trend* option on the bottom left side. This will open the *Trend screen*:

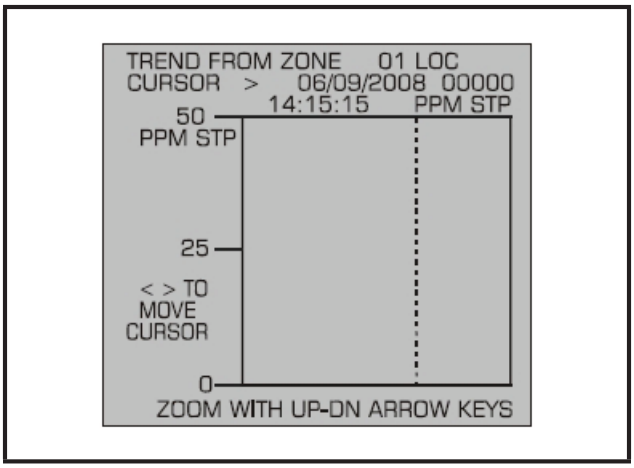


Figure 8-9 *- Trend Screen*

The trend graph opens with the cursor located over the most recent data point. Use the left/right cursor keys to move the cursor to different data points. Holding a key down will cause the cursor to move rapidly across the screen. As you move the cursor position, the date and time of that reading, along with the PPM value, are displayed at the top of the screen above the graph. The trend graph is automatically scaled to accommodate the largest PPM value displayed. The ZOOM OUT and ZOOM IN options allow you to adjust the vertical scale of the graph.

The trend data is stored on a first-in, first-out basis. After 100 trend values have been stored, the 101st value will replace the first value stored; therefore, in normal operation, when entering trend mode the cursor will be located at the most recent data point. The data points to the left of the initial cursor location will be the next most recent. The data point to the right will be the oldest data point in the buffer and will be overwritten by the next data point.

The Trend Data Log can be reset by pressing a combination of the **ENTER** and right arrow buttons while viewing the log.

When finished, press the **ESC** key to revert to the previous screen.

8.9. The Calibration Screen

8.9.1. Overview

The Calibration Screen is used to adjust the calibration factor for each refrigerant gas. It is also used to program the instrument for new gases.

IMPORTANT: Changing information on **CAL FACTOR** will VOID the factory calibration. Typically, the unit will remain within the factory-calibrated accuracy indefinitely and no calibration is required. Complex software algorithms adjust for temperature drift, IR source aging, and pressure changes in order to keep the unit within factory accuracy specifications.

8.9.2. Navigating to the Calibration Screen

On the *System Setup screen* (***Figure 7-3***), select the Calibration option abbreviated **CAL**.

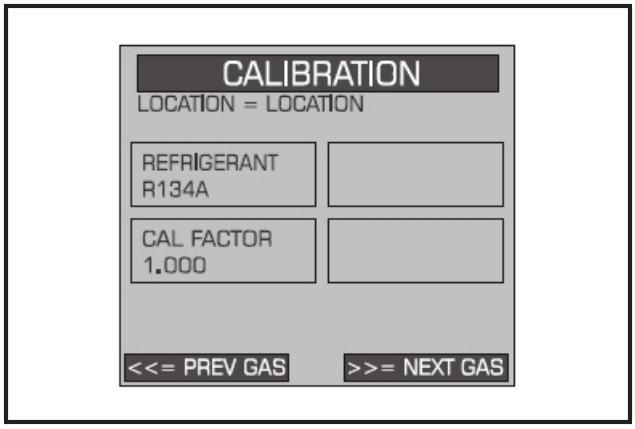


Figure 8-10 *- Calibration Screen*

8.9.3. Adjusting Calibration Factor

The factory default CAL factor for standard units is **1.000**. This value may be different if the high accuracy option is ordered. Proceed as follows to adjust the current calibration factor:

1. Use the **PREV GAS** or **NEXT GAS** options to scroll through the list of refrigerants until the gas you wish to work with is displayed.
2. Select the **CAL FACTOR** option to edit the value.
3. Use the left/right cursor keys to move across the entry field and the up/down cursor keys to modify the individual numbers.
4. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

8.9.4. CO_2 Atmospheric Concentration ($RLDS\text{-}CO_2$ Units Only)

CO_2 is supported by $RLDS\text{-}CO_2$ units. Because CO_2 is present in ambient air, a relative reading is used to determine the amount of CO_2 coming from a leak. The CAL screen offers the ability to enter the atmospheric CO_2 concentration manually. This value is typically in a range of 380-400 PPM depending on location. Enter the CO_2 concentration as follows:

1. After selecting CO_2 as the desired gas and setting the **CAL FACTOR**, you will be prompted to enter the CO_2 concentration value.
2. Use the up/down cursor keys to modify the numbers to set to the appropriate value.
3. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.

8.9.5. Calibration Procedure

The **CAL FACTOR** is determined by sampling a known dilution of the type of refrigerant gas to be sampled. The sample must be prepared to less than half the desired accuracy, and the concentration must be corrected for ambient temperature and pressure at the time of measurement.

Calibration is best performed at or near full scale (1,000 PPM). It can, however, be done at any concentration, and ideally in the range where maximum accuracy is desired down to, but not below 100 PPM.

A cylinder of refrigerant gas at a certified PPM level must be used to ensure that sampling occurs at ambient conditions. A minimum sample size of 5 liters is required.

The RLDS should be operating for at least one hour prior to performing a calibration.

Prepare the RLDS for sampling by initially setting its CAL FACTOR to **1.000**. Next, set up the RLDS for a logging interval of zero minutes (***Section 8.2.6.,*** *Log Interval*), and place the RLDS in its zone hold mode for the zone you wish to use for calibration purposes (***Section 7.10.,*** *Zone Hold Time*).

Connect the sample bag directly to the intake port for the zone you have set up and allow the RLDS to sample the entire bag. When sampling is complete, view the trend data for the zone used to sample (***Section 8.8.,*** *The Trend Screen*). Read the measured PPM

by placing the cursor on the spikes cause by the sample. If the bag was large enough for multiple samples, average the most stable ones.

The new CAL factor is computed by dividing the known gas value by the measured value. Typically this value will be between 0.95 and 1.05. This value is stored in non-volatile memory.

8.9.6. Programming New Gases

As new refrigerants come into use, the RLDS allows the addition of these new gases to its on-board refrigerant gas library. At the end of the gas library list is an option labeled **CUSTOM** for adding new gases. From the *Calibration screen* use the left/right arrows to select **CUSTOM** from the list of refrigerants. Next, press **ENTER**, and use the up/down arrow keys to enter the calibration factor.

The selection of the matching gas and **CAL** factor is performed by analyzing the new refrigerant. Once the matching gas is determined, field calibration is possible by using the same procedure as for other refrigerants. When the new gas entry is complete, simply set up the appropriate zone for **CUSTOM**.

Program the instrument for a new gas as follows:

1. From the *Calibration screen*, use the **PREV GAS** or **NEXT GAS** options to scroll through the list of available choices until the **CUSTOM** option is displayed.

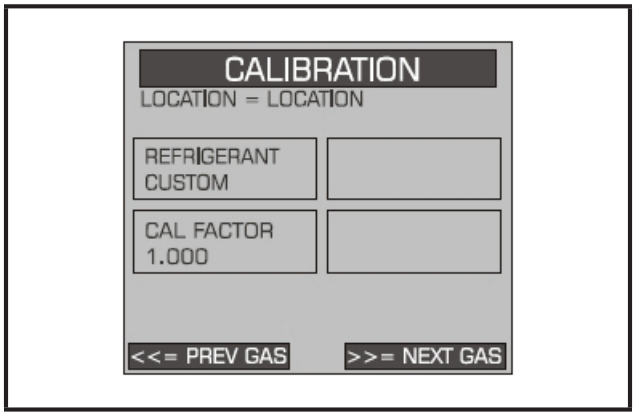


Figure 8-11 *- Custom Gas Screen*

2. Select the **CUSTOM** option. Press **ENTER** to accept the new entry or **ESC** to revert to the previous setting.
3. Enter the new CAL Factor as received from Emerson Retail Solutions.

8.10. The Diagnostic Screen

8.10.1. Navigating to the Diagnostic Screen

On the *System Setup screen* (***Figure 7-3***), select the **Diagnostic** option (**DIAG**).

Diagnostic Screen

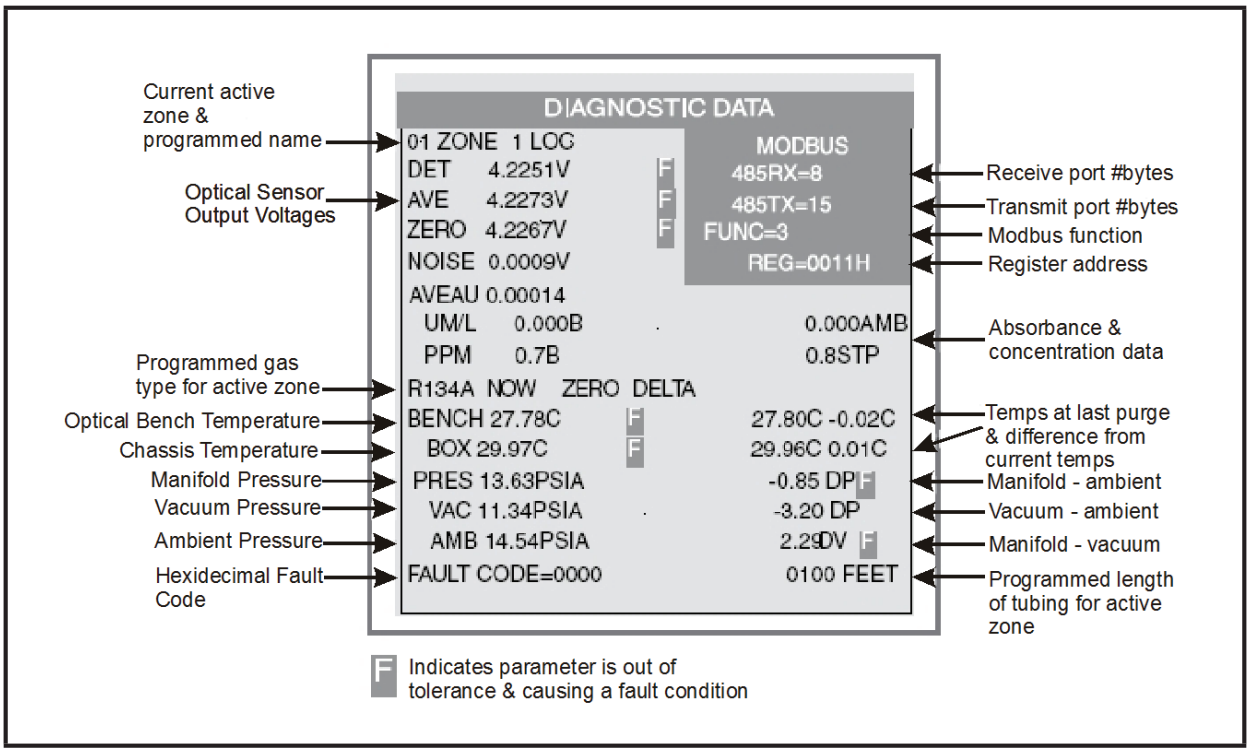


Figure 8-12 *- Diagnostic Screen Layout*

Diagnostic Options and Controls

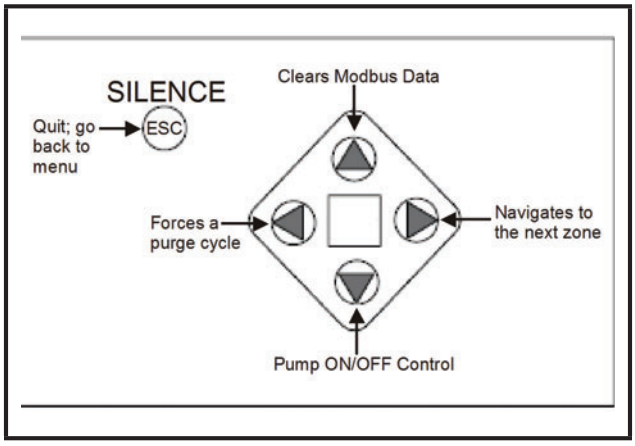


Figure 8-13 *- Diagnostic Options and Controls*

8.10.2. Diagnostic Screen Overview

The Diagnostic Screen contains sensor data and status information useful for trouble shooting various fault conditions. An explanation of each line is given below along with normal operating ranges.

DET: Detector Voltage - Peak-to-peak output of the IR sensor, in the absence of gas this value can range from 3.900V to 4.500V.

AVE: Average Detector Voltage - Running average of the values displayed in line 1 (**DET**).

ZERO: Zero Voltage - IR sensor output that was stored during the last purge cycle and has the same range as line 1 (**DET**).

NOISE: A 16-point running average of the noise portion of IR bench output. This reading is valuable mainly when refrigerant is *not* present.

AVEAU: Average Absorbency - Optical absorbency computed from the Average Detector Voltage and Zero Voltage. In the absence of refrigerant the absorbency is 0.000AU. When sampling refrigerants, its value varies proportionally with the refrigerant concentration.

UM/L: uMoles/L - Absolute concentration in micro-moles per liter of refrigerant based on **NOISE** and the internal calibration. There are two figures displayed: the first (annotated by a **B**) is the actual measurement at the IR bench. The second is the calculated value corrected to ambient conditions (temperature + pressure).

PPM: Parts Per Million is the volume concentration referenced to standard temperature and pressure and is computed from the Average Absorbency, Zero Temperature, and Ambient Pressure. There are two figures displayed. The first (annotated by a **B**) is the actual PPM at the IR bench. The second is a PPM reading normalized to standard temperature and pressure.

ZERO: Zero Temperature - Displays the sensor and enclosure temperature measured and stored during the last purge cycle in degrees C.

BENCH: Bench Temperature - Current IR sensor temperature in degrees C as well as the raw voltage coming from the temperature sensor. This value can range from ambient to ambient +15 degrees C.

BOX: Box Temperature - Current internal enclosure temperature along with the raw voltage from the temperature sensor, and has the same range as Bench Temperature.

PRESS: Pressure - Current absolute manifold pressure in PSIA along with the output voltage of the pressure sensor. This value should always be 0.2 to 1.0 PSIA below Ambient Pressure (**AMB**).

VAC: Vacuum - The vacuum pressure is measured every purge cycle by closing all sample valves. Its value is typically 2.5 to 4.0 PSIA below Ambient Pressure (**AMB**).

AMB: Ambient - Ambient pressure is measured every purge cycle with the sample pump off and the manifold open. Its value is weather and altitude dependent and can range from 10.0 to 15.5 PSIA.

FAULT CODE: For fault code information, see the fault code list ***(Table 8-3 on page 45)***.

***XXXX* FEET**: Programmed length of tubing for an active zone.

8.11. Service Mode

The **Service Mode** option is located on the *System Setup screen* in the bottom right corner.

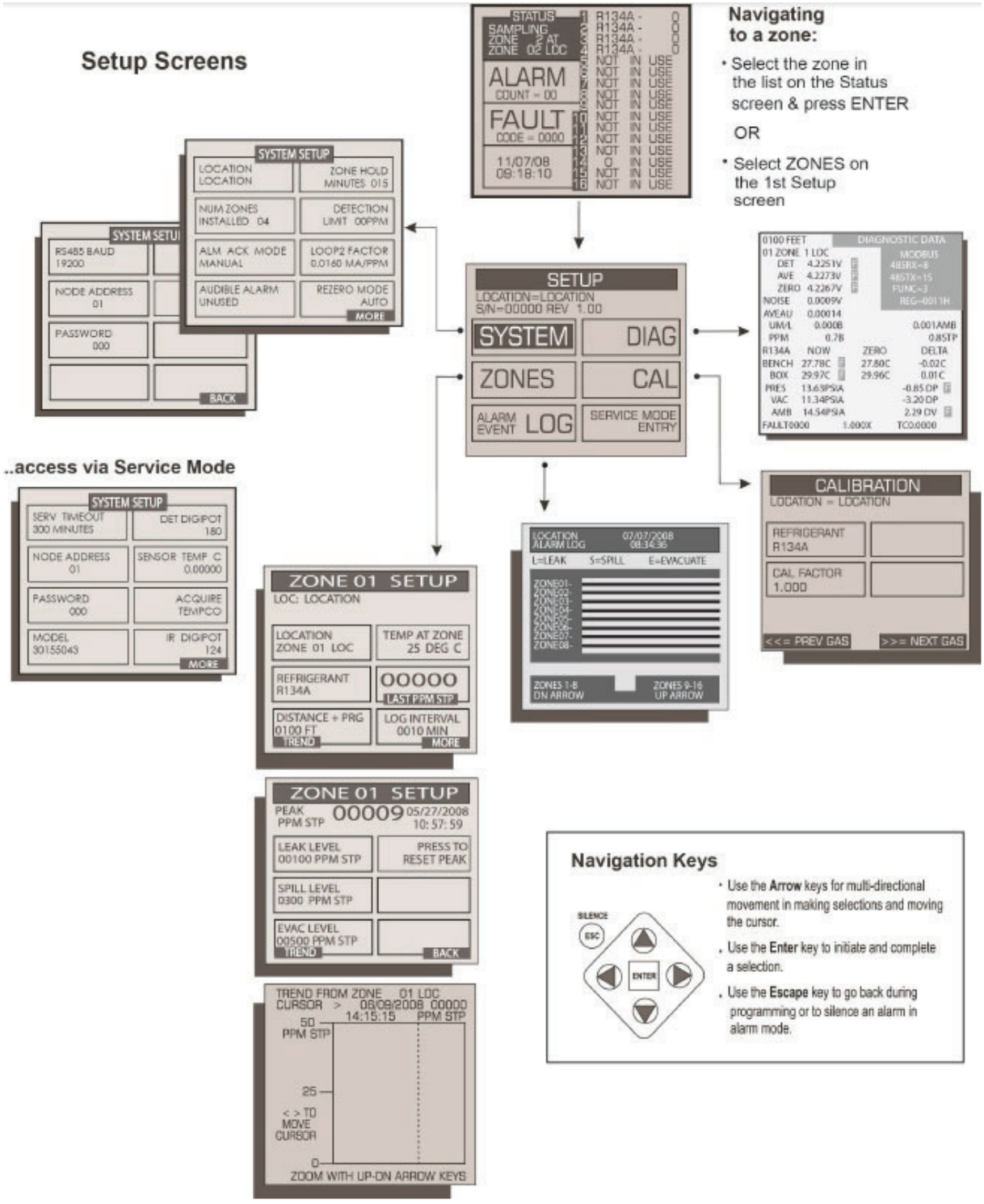
When activated, Service Mode will disable the RLDS unit for a specified length of time. The default is **60** minutes. This time interval can be changed as described in ***Section 7.15.,*** *Service Timeout*.

IMPORTANT: Note that while in the Service Mode no measurements are made, nor are any alarms activated.

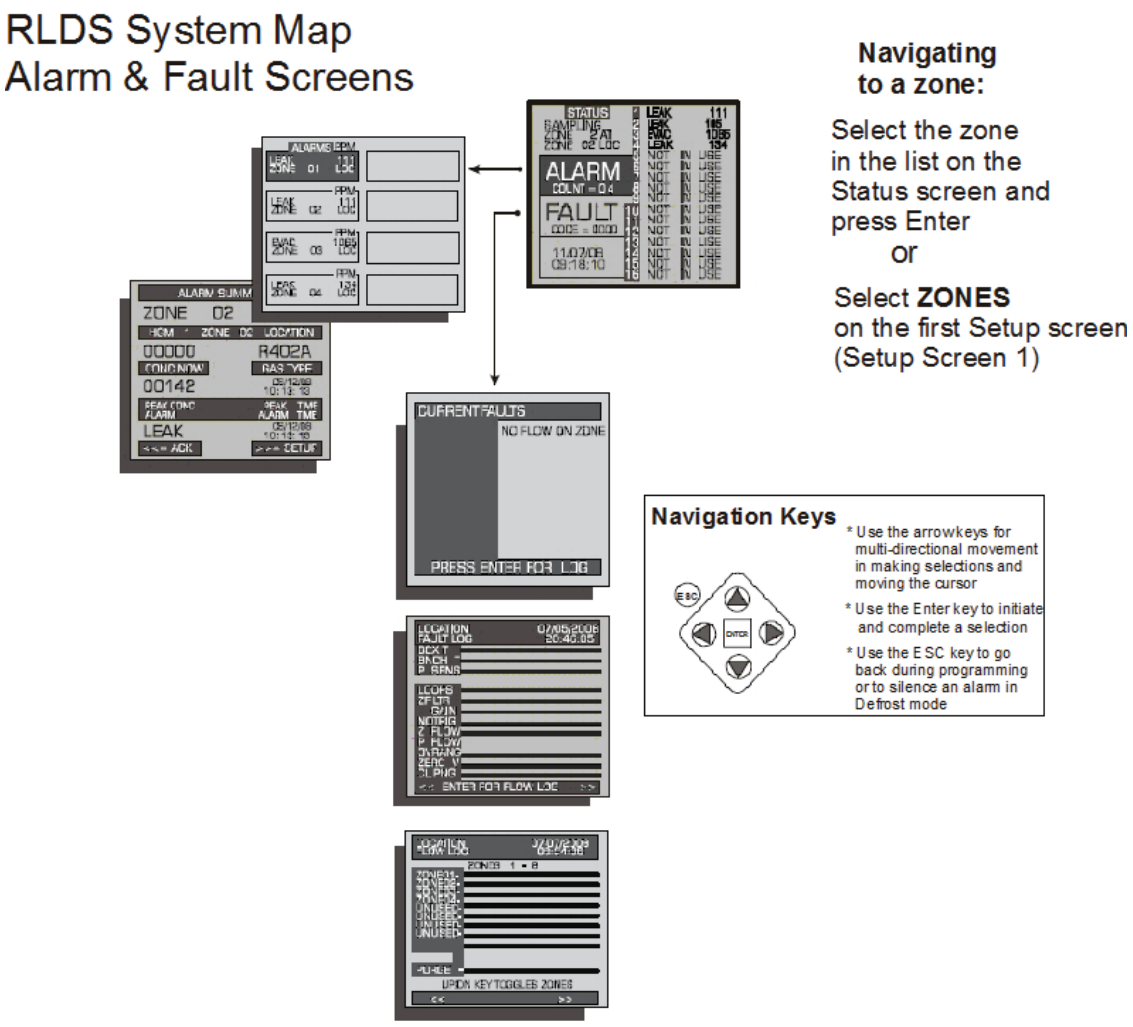
Access the Service Mode options from the initial *Status screen*. Press the **SERVICE MODE ENTRY** option twice within 3 seconds.

To exit the Service Mode, again press the **SERVICE MODE ENTRY** option *twice within 3 seconds*.

RLDS Setup Screens - System Map



RLDS Alarm and Fault Screens - System Map


RLDS System Map
Alarm & Fault Screens
Navigating to a zone:
Select the zone in the list on the Status screen and press Enter
or
Select ZONES on the first Setup screen (Setup Screen 1)
STATUS
ALARM
FAULT
ALARM SUMM
ZONE 02
CURRENT FAULTS
NO FLOW ON ZONE
PRESS ENTER FOR LOG
Navigation Keys
* Use the arrowkeys for multi-directional movement in making selections and moving the cursor
* Use the Enter key to initiate and complete a selection
* Use the ESC key to go back during programming or to silence an alarm in Defrost mode

Recommended Gas Alarm Settings

Refrigerant	Leak PPM	Spill PPM	Evacuate PPM
R11	100	300	500
R12	100	300	500
R22	100	300	500
R23	100	300	500
R113	100	300	500
R114	100	300	500
R123	25	35	35
R124	100	300	500
R134A	100	300	500
R401A	100	300	500
R402A	100	300	500
R402B	100	300	500
R404A	100	300	500
R407A	100	300	500
R407C	100	300	500
R409A	100	300	500
R410A	100	300	500
R500	100	300	500
R502	100	300	500
R503	100	300	500
R507	100	300	500
R50B	100	300	500
H1301	100	300	500
R408A	100	300	500
FA188	100	300	500
R236FA	100	300	500
N1230	100	300	500
R227	100	300	500
HFP	100	300	500
FC72	100	300	500
R21	100	300	500
R125	100	300	500
H1211	100	300	500
H2402	100	300	500
Custom	100	300	500
R245FA Supported in Gateway version 1.2 and above	100	300	500

Table 8-1 *- Recommended Alarm Settings and Gas Enumeration*

Refrigerant	Leak PPM	Spill PPM	Evacuate PPM
R422A Supported in Gateway version 1.2 and above	100	300	500
R422D Supported in Gateway version 1.2 and above	100	300	500
R427A Supported in Gateway version 1.2 and above	100	300	500
CO_2/R-744 Supported in Gateway version 1.2 and above	1500	2000	3000

***Table 8-1** - Recommended Alarm Settings and Gas Enumeration*

MODBUS Gas Enumeration

Refrigerant	DEC	HEX	Refrigerant	DEC	HEX
P11	0	0	R507	20	14
R12	1	1	R50813	21	15
R22	2	2	H1301	22	16
R23	3	3	R408A	23	17
R113	4	4	FA188	24	18
R114	5	5	R236FA	25	19
R123	6	6	N1230	26	1A
R124	7	7	R227	27	16
R134A	8	8	HFP	28	IC
R401 A	9	9	FC72	29	ID
R402A	10	OA	R2.1	30	1E
R4028	11	8	R125	31	IF
R404A	12	OC	H12.11	32	20
R407A	13	OD	H2402	33	21
R407C	14	OE	R245FA	sa	22
R409A	15	OF	R422A	35	23
R410A	16	10	R422D	36	24
R500	17	11	R427A	37	25
R502	18	12	CO2/R-744	0	0
R503	19	13	CO2/R-744	0	0

***Table 8-2** - MODBUS Gas Enumeration*

Fault Codes

BIT	Fault Type	Code	Description
15	CLIPPING FAULT	0x8000	Sensor output voltage too high
14	ZERO RANGE FAULT	0x4000	Sensor output voltage outside limits during purge
13	OVER RANGE FAULT	0x2000	Gas concentration above measurable range
12	PURGE FLOW FAULT	0x1000	No flow detected during purge cycle
11	ZONE FLOW FAULT	0x0800	No flow detected during sample cycle
10	A2D FAULT	0x0400	Analog to digital converter not working
9	GAIN SET FAULT	0x0200	Digipot gain setting out of normal range
8	ZERO FILTER FAULT	0x0100	Charcoal filter (if used) needs replacement
7	CONFIG FAULT	0x0080	No zones are enabled
6	UNUSED FAULT 2	0x0040	Not used
5	UNUSED FAULT 1	0x0020	Not used
4	LOOP FAULT	0x0010	Current loop is open
3	RS485 FAULT	0x0008	Communication error
2	MANIFOLD P FAULT	0x0004	Pressure sensor readings are out of range
1	BENCH T FAULT	0x0002	Sensor temperature is out of range
0	BOX T FAULT	0x0001	Chassis temperature is out of range

Table 8-3 *- Fault Codes*

9 Quick Setups for Hand-Held Terminal (HHT)

Summaries of Zone Setup and Date/Time Setup have been included here for your convenience. For more detailed information about these setup procedures, please refer to their respective sections in this manual.

9.1. Time/Date Setup

Time and date is set from the CONFIG OPTION screen.

1. From the Home screen (**F1**), press the down arrow key three (3) times to display the OPTION screen:

NOTE: There is a short interval after the message WAITING ON READ FROM RLDS.

```
OPTION: 1
    1 = RLDS STATUS
    2 = RLDS FAULTS
    3 = RLDS CONFIG
```

2. Press the right arrow key and select **3**.
3. Press the down arrow key twice to display the CONFIG OPTION screen:

```
CONFIG OPTION: 1
   1 = RLDS CTRL
   2 = TIME/DATE
   3 = CALIB GASES
```

4. Press the right arrow key and select **2**.
5. Press the down arrow key twice to open the TIME/DATE screen:

```
1-DATE:  xx-xx-xx
1-TIME: xx:xx:xx
```

NOTE: For TIME, enter military time only.

A change in the Time/Date on any one of the RLDS controllers changes ALL of the RLDS controllers on the network.

6. Press the right arrow key to edit the fields. The right and down arrow keys scroll downward through the list, while the left or up arrow keys will backspace the arrow so you may go back to change a field.
7. Press the up arrow key to scroll back up to the CONFIG OPTION screen to calibrate gases. Your changes are saved and the data is written when you scroll back up to the CONFIG OPTION screen.

9.2. Zone Setup

9.2.1. General Configuration 1 Screen

1. From the CONFIG OPTION screen, press the right arrow key and then press the **1** key for **RLDS CTRL**.
2. Press the down arrow key twice to display the General Configuration 1 screen:

```
Ux: ENABLED:DISABLED
Ux- ZONES: 8
Ux- MODEL: 300
Ux- REV  : 1.12
```

NOTE: x is the RLDS currently being accessed.

3. Press the down arrow key to display the General Configuration 2 screen:

9.2.2. General Configuration 2 Screen

```
U1: NAME OF CONTROLLER

1 - BUZZER: NONE
1 - AL  ACK: MANUAL
```

NOTE: The "blank" line is used to provide a cursor so the user knows which character they are editing. The "." and "—" keys are used to scroll an individual character selection or numeric numbers can be entered directly.

4. Press the right arrow key to activate the **U1** field so you can change the name of the controller. Use the right and left arrow keys to move across the field to select each letter, and remember to use the "." and "**—**" keys to toggle letters.
5. Press the down arrow key to move from the **U1** field to the **BUZZER** field. The default for this field is set to **NONE.** Use the "." and "**—**" keys to scroll through the choices: **NONE**, **ALARM**, **FAULT**, **LEAK**, **SPILL**, **EVAC**, or **MN OFF** (monitor is offline and is no longer monitoring the refrigerant lines).
6. Press the down arrow key to move from the **BUZZER** field to the **AL ACK** field. The default for this field is set to **MANUAL**, but it is recommended the setting be changed to **AUTO** so the zone can automatically reset itself after the condition clears.

NOTE: In MANUAL mode an alarm will not clear until it is acknowledged and the alarm condition is no longer active. Even if the alarm is no longer active and it has been acknowledged, it is not cleared until the next time that zone is read. On a 16-zone device this will take at least four (4) minutes.

7. Press the down arrow key to scroll you to the next screen:

9.2.3. Zone Config Screen 1

The Zone Configuration Screen 1 is used to configure an individual zone:

```
01: ZONE 01 LOC

01 - REFRIG:
01 - LENGTH:
```

- ZONE (name) can be 1-12 characters and is an alphanumeric representation of the location of the zone.
- REFRIG (refrigerant) is the gas being detected in that zone. The default is set to R134a and must be changed using the "." and "**—**" keys to select the appropriate refrigerant.
- LENGTH (tubing length) is the total tubing length for that zone. Length is 500 feet for an active zone and 0 (zero) for a deactivated zone. The tubing range is 0-500 feet.

NOTE: The "blank" line is used to provide a cursor so the user knows which character they are editing. The "." and "—" keys are used to scroll an individual character selection or numeric numbers can be entered directly.

8. Press the right arrow key to activate the **ZONE** (name of zone) field so you can change the name of the zone. Use the right and left arrow keys to move across the field to select each letter, and remember to use the "." and "**—**" keys to toggle letters.
9. Press the down arrow key to move from the **ZONE** field to the **REFRIG** field. The default for this field is set to R134a, but use the "." and "**—**" keys to scroll through the refrigerant choices.
10. Press the down arrow key to move from the **REFRIG** field to the **LENGTH** field. Enter the length of tubing for the zone.

NOTE: Set LENGTH to 0 (zero) for any zones not being used.

11. Press the down arrow key to display the Zone Config Screen 2:

9.2.4. Zone Config Screen 2

```
01-ZONE TMP: xxx
01-ALM LEAK: xxx
01-ALM SPIL: xxx
01-ALM EVAC: xxx
```

This zone screen is where alarm levels for each zone are set. Each zone can be set to a different level for each of the values, and the values activate the relays inside the RLDS.

01 is the variable indicating which zone number you are working with. Use the up and down arrow keys to cycle through the active zones for each RLDS. Continue for the remaining zones until all zones are configured.

- ZONE TMP is in degrees C
- ALM LEAK= LEAK Level: Level to trigger a leak alarm in PPM. (Default is 100 with a range of 1-1000 PPM)
- ALM SPIL= SPILL Level: Level to trigger a spill alarm in PPM. (Default is 300 with a range of 1-1000 PPM)
- ALM EVAC= EVACUATE Level: Level to trigger an evacuate alarm in PPM. (Default is 500 with a range of 1-1000 PPM)

Press the down arrow from the Zone Config Screen 2 to display the RLDS Configuration Option (CONFIG OPTION) screen. (**Section 11.4.3.**)

The **WAITING ON WRITE TO RLDS** message displays, and after a short interval prompts you to the CONFIG OPTION screen.

9.3. STATUS OPTION Screen

From the STATUS OPTION screen, you are able to check zone status (individual zones), ctrl status (overall controller status), and diagnostics (diagnostic zone data).

```
STATUS OPTION:
    1 = ZONE STATUS
    2 = CTRL STATUS
    3 = DIAGNOSTICS
```

To display ZONE STATUS: (individual zones), press the right arrow key and press **1.** Press the down arrow key twice. The ZONE STATUS screen displays:

9.3.1. Zone Status Screen

```
01: ZONE 01 LOC
1-01: 0  LEAK  A
02: ZONE 02 LOC
1-02:           A
```

ACKNOWLEDGING ALARMS:

Each status will be listed for each individual zone, and any alarms can be noted from here.

Press the down arrow key from the Zone Status screen to scroll through the status concentration for each of the zones in use. The PPM concentration will be shown, alarm/failure indication, and if the alarm is acknowledged. If the zone is normal (no alarm detected), the alarm/failure fields and alarm acknowledge field (where **LEAK A** appears) should be blank. In order to acknowledge the alarm, press the CANCEL key so the **A** appears next to the alarm.

LEAK, SPIL(L), or EVAC(UATE) will display if there is an alarm. If there is a flow problem (failure) for the zone, FLOW displays. A failure cannot be acknowledged--only LEAK, SPIL, or EVAC alarms can be acknowledged.

Press the down arrow key to scroll through and view all of the zones.

NOTE: If the user selects a specific channel that is an alarm and presses the CANCEL key, the alarm will be acknowledged.

To display CTRL STATUS: (overall controller status), press the right arrow key and press **2**. Press the down arrow key twice. The General Controller (CTRL STATUS) screen displays:

9.3.2. General Controller (CTRL STATUS) Screen

```
Ux-MODE: NORMAL
Ux-STAT: <ZEROING:SAMPLE>
Ux-ALARM CNT:
Ux-ACT ZONE:
```

NOTE: x is the RLDS.

If the user selects the **MODE** field they will be able to change the mode the zone is in. If the user selects the **ACT ZONE** field, the current zone being sampled can be changed.

The user can toggle the zone mode (in the **MODE** field) by pressing the right arrow key to activate the field and using the "." and "—" keys to select between **NORMAL**, **HOLD**, and **SERVICE**. If the zone is set to **HOLD** mode, the zone is continuously sampled.

Press the down or up arrow key to go back to the STATUS OPTION screen. Your changes are saved and data written upon scrolling back to the STATUS OPTION screen.

NOTE: When setting up multiple zones in one area (such as a motor room), stagger these zones as they enter the RLDS. For example, if there are two motor rooms served by one RLDS, each motor room has three sensing zones. Make the first motor room zones 1, 3, and 5, and make the second motor room zones 2, 4, and 6. This will allow the leak detection system to return to that area being sensed more regularly.

If the zone exists in a location where air flow will affect the dispersion of refrigerant, reduce the alarm limits to a lower level than usual. This will allow for dispersion of the refrigerant in the air.

10 Hand-Held Terminal (HHT) for use with the Gateway and RLDS Controller

The Hand-Held Terminal (HHT) connects directly to the Gateway and is used for the initial setup and to run the system. The HHT allows the user to make set-point and setup adjustments during system start-up, and changes for routine or emergency maintenance. The HHT displays several screens for viewing leak system status, making control set point adjustments, and adjusting at what PPM an alarm should sound. Setpoint changes made through the HHT are transferred to the RLDS controller and overwrite any existing set points.

The HHT shares the communication port with the I/O Net, and while the HHT is plugged in you can get a momentary loss of communication on the I/O Net. This may result in concentrations, showing **NONE** momentarily.

10.1. HHT Key Operations

The arrow keys will be used to move between fields and screens.

Special Keys:

- **F1** - Save current changes and go back to Screen 1 (Home screen).
- **F2** - Save current changes and go back to Screen 3 (SELECT RLDS screen).
- **CANCEL** - Clear an edit field or acknowledge an alarm on the status screen.
- **ENTER** - Checks if the entry is valid.
- Right arrow key - moves to the next editable field or moves right one character in alpha name fields.
- Left arrow key - moves to the previous edit field or moves left one character in alpha name fields.
- Down arrow key - moves to the next edit field if one is selected or advances to the next screen if no edit field is selected.
- Up arrow key - moves to the previous edit field if one is selected or moves back to the previous screen if no field is selected.
- "**.**" - Toggle option select fields or scroll alpha characters for names, and acts as a decimal point for floating point numbers.

The period key is the lower-most button on the bottom left of the HHT.

- "**—**" - Toggle option select fields or scroll alpha characters for names, and acts as a minus sign for numeric entry.

The dash key is the lower-most button on the bottom right of the HHT.

NOTE: Editable fields are activated when the right arrow appears next to them.

11 Main Screens

11.1. Home Screen (F1 Screen)

Press **F1** at any point to save changes and display the Home screen:

```
RLDS GW-810-3760
  VER: 1.10B04
 FAIL:  I/O NET
(PRESS DOWN ARROW)
```

The HHT is used to display the following on the Home screen:

- **RLDS GW-810-3760**: Model information
- **1.10B04**: Version number
- **FAIL: I/O NET**: Displays the operation mode on the third line of the HHT screen. This indicates which type of area controller the RLDS Gateway is attached to. The dip switch 8 is set to ON or OFF.
  ON = REFLECS, OFF = E2, Einstein. If a failure condition exists with the RLDS Gateway, this line shows one of the following failure messages:

FAIL: I/O NET indicates that no communication with the I/O Net exists, and that communication between the controllers is down.

FAIL: FLASH/CLK indicates the hardware is bad and the Gateway should be replaced.

FAIL: USER CFG indicates that no RLDS units have been found on the network, and have not been configured by the user.

FAIL: RLDS CTRL indicates that one or more RLDS controllers are down.

- **PRESS DOWN ARROW** indicates what to do next.

NOTE: Pressing the down arrow scrolls you to the next screen.

11.2. RLDS Enable Screen

The second screen will show whether a particular unit is enabled, disabled, or unknown. When the RLDS Gateway first powers up it will show **UNKOWN** for all units. It will then start scanning for each unit. If it finds a unit, it marks it as **ENABLED**.

If an RLDS is not present on the network, the user can mark that RLDS as **DISABLED** to prevent the Gateway from scanning for that unit. When the unit is disabled, the Gateway stops trying to access the RLDS controller and does not respond to the association request on the I/O Network.

```
RLDS LIST:
RLDS1: ENABLED
RLDS2: DISABLED
RLDS3: DISABLED
```

Press the down arrow to go to the next screen:

11.3. SELECT RLDS Screen (F2 Screen)

Press **F2** at any point to save changes and display the SELECT RLDS screen:

```
SELECT RLDS: 1
LDS1: ONLINE
RLDS2: DISABLED
RLDS3: DISABLED
```

NOTE: SELECT RLDS: 1 defaults to 1.

The F2 screen allows you to select the desired RLDS. The F2 screen shows the general **ONLINE** or **OFFLINE** status for the enabled RLDS controllers. **ONLINE** means the Gateway is successfully communicating with an enabled RLDS controller. If it is unknown whether an RLDS is present on the network, the screen will display **UNKNOWN**.

Select the desired RLDS by pressing the right arrow key and selecting the desired RLDS number. Press the down arrow key to prompt you to the Operation Select (OPTION) screen.

The WAITING ON READ FROM RLDS message displays, and after a short delay prompts you to the Operation Select (OPTION) screen.

11.4. Operation Select (OPTION) Screen

The Operation Select (OPTION) screen enables the user to select the following entry points:

```
OPTION: 1
     1 = RLDS STATUS
     2 = RLDS FAULTS
     3 = RLDS CONFIG
```

NOTE: OPTION: 1 defaults to 1.

Press the right arrow key to enable you to change the number selection next to **OPTION**. When a right arrow appears after **OPTION**, press the number key of the desired screen (1,2, or 3). Press the down arrow key twice to display the selected screen.

- Select 1 to access the RLDS STATUS screen

See **Section 11.5.,** *STATUS OPTION Screen*.

- Select 2 to access the RLDS FAULTS screen

See **Section 11.4.2.,** *RLDS FAULTS (SYSTEM FAULTS) screen*.

- Select 3 to access the RLDS CONFIG screen

See **Section 11.4.3.,** *RLDS Configuration Option (CONFIG OPTION) Screen*

11.4.1. RLDS STATUS (STATUS OPTION) Screen

The STATUS OPTION screen allows you to check individual zones, overall controller status, and diagnostic data. Refer to **Section 11.5.,** *STATUS OPTION Screen* to find out more information about accessing these screens.

```
STATUS OPTION:
     1 = ZONE STATUS
     2 = CTRL STATUS
     3 = DIAGNOSTICS
```

- ZONE STATUS gives status on individual zones

See **Section 11.5.1.,** *Zone Status Screen*.

- CTRL STATUS is overall controller status

See **Section 11.5.2.,** *General Controller (CTRL STATUS) Screen*.

- DIAGNOSTICS is diagnostic zone data

See **Section 11.5.3.,** *DIAGNOSTICS Screen 1: Sensor Data Register*.

11.4.2. RLDS FAULTS (SYSTEM FAULTS) screen

From the Operation Select (OPTION) screen, (**Section 11.4.**) select **RLDS FAULTS** by pressing the right arrow key, selecting **2**, and pressing the down arrow key twice.

The RLDS FAULTS screen will display a list of the system failures associated with the selected RLDS. One failure will be displayed on each line.

NOTE: Once a fault is detected and repaired, the unit will go through an entire cycle and the fault will clear itself and return to normal.

```
SYSTEM FAULTS
```

The following are failure messages that are used:

CLIPPNG FAULT - A/D out of range
ZERO FAULT - Zero voltage outside factory limits
NO FLOW - No flow on any zone
PURGE FLOW - No flow on purge
ZONE FLOW - No flow on one or more zones
TRIGGER FAULT - IR Source clock trigger missing
CONFIG FAULT - No zones enabled

LOOP FAULT - Open current loop
PRESSURE RANGE - Pressure out of range
BENCH TEMP - Bench temperature out of range
BOX TEMP - Box temperature fault

11.4.3. RLDS Configuration Option (CONFIG OPTION) Screen

From the Operation Select (OPTION) screen, (**Section 11.4.**) select **RLDS CONFIG** by pressing the right arrow key, selecting **3**, and pressing the down arrow key twice. The CONFIG OPTION screen displays and allows the user to configure the selected RLDS:

```
CONFIG OPTION: 1
   1 = RLDS CTRL
   2 = TIME/DATE
   3 = CALIB GASES
```

Press the right arrow key to enable you to change the number selection that appears next to **CONFIG OPTION**. When a right arrow appears after **CONFIG OPTION**, press the number key of the desired screen (1,2, or 3). Press the down arrow key twice to display the selected screen.

- Select 1 to access the General Configuration 1 Screen

See **Section 11.4.4.,** *General Configuration 1 Screen*.

- Select 2 to access the Time/Date screen

See **Section 11.4.8.,** *Time/Date Screen*.

- Select 3 to access the Calibrate/Refrigerant screens

See **Section 11.4.9.,** *Calibrate Gas Screen 1*.

11.4.4. General Configuration 1 Screen

From the CONFIG OPTION screen, press the right arrow key and then press the **1** key for **RLDS CTRL**. Press the down arrow key twice to display the General Configuration 1 (a non-editable) screen:

```
Ux: ENABLED:DISABLED
Ux- ZONES: 8
Ux- MODEL: 300
Ux- REV  : 1.12
```

NOTE: x is the RLDS currently being accessed.

Press the down arrow key to display the General Configuration 2 screen:

11.4.5. General Configuration 2 Screen

```
U1: NAME OF CONTROLLER

1 - BUZZER: NONE
1 - AL  ACK: MANUAL
```

NOTE: The "blank" line is used to provide a cursor so the user knows which character they are editing. The "." and "—" keys are used to scroll an individual character selection or numeric numbers can be entered directly.

Press the right arrow key to activate the **U1** field so you can change the name of the controller. Use the right and left arrow keys to move across the field to select each letter, and remember to use the "." and "—" keys to toggle letters.

Press the down arrow key to move from the **U1** field to the **BUZZER** field. The default for this field is set to **NONE.** Use the "." and "—" keys to scroll through the choices: **NONE**, **ALARM**, **FAULT**, **LEAK**, **SPILL**, **EVAC**, or **MN OFF** (monitor is offline and is no longer monitoring the refrigerant lines).

Press the down arrow key to move from the **BUZZER** field to the **AL ACK** field. The default for this field is set to **MANUAL**, but it is recommended the setting be changed to **AUTO** so the zone can automatically reset itself after the condition clears.

NOTE: In MANUAL mode, an alarm will not clear until it is acknowledged and the alarm condition is no longer active. Even if the alarm is no longer active and it has been acknowledged, it is not cleared until the next time that zone is read. On a 16-zone device this will take at least four (4) minutes.

The down arrow key will scroll you to the next screen:

11.4.6. Zone Config Screen 1

The Zone Configuration Screen 1 is used to configure an individual zone:

```
01: ZONE 01 LOC

01 - REFRIG:
01 - LENGTH:
```

- ZONE (name) can be 1-12 characters and is an alphanumeric representation of the location of the zone.
- REFRIG (refrigerant) is the gas being detected in that zone. The default is set to R134a and must be changed using the "." and "—" keys to select the appropriate refrigerant.
- LENGTH (tubing length) is the total tubing length for that zone. Length is 500 feet for an active zone and 0 (zero) for a deactivated zone. The tubing length range is 0-500 feet.

NOTE: The "blank" line is used to provide a cursor so the user knows which character they are editing. The "." and "—" keys are used to scroll an individual character selection or numeric numbers can be entered directly.

Press the right arrow key to activate the **ZONE** (name of zone) field so you can change the name of the zone. Use the right and left arrow keys to move across the field to select each letter, and remember to use the "." and "—" keys to toggle letters.

Press the down arrow key to move from the **ZONE** field to the **REFRIG** field. The default for this field is set to R134a, but use the "." and "—" keys to scroll through the refrigerant choices.

Press the down arrow key to move from the **REFRIG** field to the **LENGTH** field. Enter the length (1' to 500') of tubing for the zone.

NOTE: Set LENGTH to 0 (zero) for any zones not being used.

11.4.7. Zone Config Screen 2

```
01-ZONE TMP: xxx
01-ALM LEAK: xxx
01-ALM SPIL: xxx
01-ALM EVAC: xxx
```

This zone screen is where alarm levels for each zone are set. Each zone can be set to a different level for each of the values, and the values activate the relays inside the RLDS.

01 is the variable indicating which zone number you are working with. Use the up and down arrow keys to cycle through the active zones for each RLDS. Continue for the remaining zones until all zones are configured.

- ZONE TMP is in degrees C
- ALM LEAK= LEAK Level: Level to trigger a leak alarm in PPM. (Default is 100 with a range of 1-1000 PPM)
- ALM SPIL= SPILL Level: Level to trigger a spill alarm in PPM. (Default is 300 with a range of 1-1000 PPM)
- ALM EVAC= EVACUATE Level: Level to trigger an evacuate alarm in PPM. (Default is 500 with a range of 1-1000 PPM)

Press the down arrow from the Zone Config Screen 2 to display the RLDS Configuration Option (CONFIG OPTION) screen. (**Section 11.4.3.**)

NOTE: When setting up multiple zones in one area (such as a motor room), stagger these zones as they enter the RLDS. For example, if there are two motor rooms served by one RLDS, each motor room has three sensing zones. Make the first motor room zones 1, 3, and 5, and make the second motor room zones 2, 4, and 6. This will allow the leak detection system to return to that area being sensed more regularly.

If the zone exists in a location where air flow will affect the dispersion of refrigerant, reduce the alarm limits to a lower level than usual. This will allow for dispersion of the refrigerant in the air.

11.4.8. Time/Date Screen

From the CONFIG OPTION screen, set the time and date. Press the right arrow key and select **2**. Press the down arrow key twice to open the TIME/DATE screen:

```
1-DATE:  xx-xx-xx
1-TIME: xx:xx:xx
```

NOTE: For TIME, enter military time only.

A change in the Time/Date on any one of the RLDS controllers changes ALL of the RLDS controllers on the network.

Press the right arrow key to edit the fields. The right and down arrow keys scroll downward through the list, while the left or up arrow keys will backspace the arrow so you may go back to change a field.

Press the up arrow key to scroll back up to the CONFIG OPTION screen to calibrate gases. Your changes are saved and the data is written when you scroll back up to the CONFIG OPTION screen.

11.4.9. Calibrate Gas Screen 1

CAUTION: The Calibrate Gas screens are rarely used. Before modifying values in the Calibration screens, contact your Emerson Retail Solutions representative for Correction Values.

The Calibrate Data message is used to calibrate the gases used. It is read only if the user enters the configuration screen for HHT screens.

From the CONFIG OPTION screen, press the right arrow key and then press the **3** key for **CALIB GASES**. Press the down arrow key twice and wait for the **WAITING ON READ FROM RLDS** message to clear to display the Calibration Gas screens.

```
x - R11: xxx.x
x - R12: xxx.x
x - R22: xxx.x
x - R23: xxx.x
```

NOTE: User enter a floating point number for x.

Press the down arrow key so the Calibrate Gas Screen 1 will cycle through all gases and view the available gases in the gas library. Press the down arrow key to cycle Calibrate Gas screens 2 and 3 to complete the calibration process:

11.4.10. Calibrate Gas Screen 2

```
1 - CURVE 1: xxx
1 - CURVE 2: xxx
1 - CURVE 3: xxx
<blank>
```

NOTE: User enter a curve number for New Gas Type 1 for x.

Use the "." and "—" keys to scroll through the supported gas/refrigerants.

Press the down arrow key:

11.4.11. Calibrate Gas Screen 3

User can select names for each new gas/refrigerants by pressing the right arrow key to activate the field and using the "." and "—" keys to toggle the letters.

```
1:  NEW GAS1

2:  NEW GAS2

3:  NEW GAS3
```

Press the down arrow key:

11.4.11.1. Calibrate Gas Screen 3 Continued

```
3:  NEW GAS3
```

The default gas name is **NEW GAS1**.

NOTE: The "blank" line is used to provide a cursor so the user knows which character they are editing. The user can use "." and "—" keys to scroll an individual character selection or numeric numbers can be entered directly.

Pressing the down arrow key brings you back to the CONFIG OPTION screen. To move back to the STATUS OPTION screen, first press the up arrow key to go back to the OPTION screen and select **1** for RLDS STATUS. You should now be back at the STATUS OPTION screen.

11.5. STATUS OPTION Screen

From the STATUS OPTION screen, you are able to check zone status (individual zones), ctrl status (overall controller status), and diagnostics (diagnostic zone data).

```
STATUS OPTION:
    1 = ZONE STATUS
    2 = CTRL STATUS
    3 = DIAGNOSTICS
```

To display ZONE STATUS: (individual zones), press the right arrow key and press **1.** Press the down arrow key twice. The ZONE STATUS screen displays.

11.5.1. Zone Status Screen

```
01: ZONE 01 LOC
1-01: 0   LEAK   A
02: ZONE 02 LOC
1-02:             A
```

The PPM count, alarm status, and alarm acknowledge information is displayed for each individual zone.

Press the down arrow key from the Zone Status screen to scroll through the status concentration for each of the zones in use. The PPM concentration will be shown, alarm/failure indication, and if the alarm is acknowledged. If the zone is normal (no alarm detected), the alarm/failure fields and alarm acknowledge field (where **LEAK A** appears) should be blank.

ACKNOWLEDGING ALARMS

In order to acknowledge an alarm, press the left or right arrow keys to select the zone and then press the **CANCEL** key so the **A** appears next to the alarm. When the **A** appears, the alarm has been acknowledged.

LEAK, SPIL(L), or EVAC(UATE) will display if there is an alarm. If there is a flow problem (failure) for the zone, FLOW displays. A failure cannot be acknowledged--only LEAK, SPIL, or EVAC alarms can be acknowledged.

Use the down arrow key to scroll through and view all of the zones.

After you have scrolled through the zones you are back at the STATUS OPTION screen where you can make another selection.

To display CTRL STATUS: (overall controller status), press the right arrow key and press **2**. Press the down arrow key twice. The General Controller (CTRL STATUS) screen displays:

11.5.2. General Controller (CTRL STATUS) Screen

```
Ux-MODE: NORMAL
Ux-STAT: <ZEROING:SAMPLE>
Ux-ALARM CNT:
Ux-ACT ZONE:
```

NOTE: x is the RLDS.

If the user selects the **MODE** field they will be able to change the mode the zone is in. If the user selects the **ACT ZONE** field, the current zone being sampled can be changed.

The user can toggle the zone mode (in the **MODE** field) by pressing the right arrow key to activate the field and using the "." and "—" keys to select between **NORMAL**, **HOLD**, and **SERVICE**. If the zone is set to **HOLD** mode, the zone is continuously sampled.

Press the down or up arrow key to go back to the STATUS OPTION screen. Your changes are saved and data written upon scrolling back to the STATUS OPTION screen.

To display DIAGNOSTICS: (diagnostic zone data), press the right arrow key and press **3**. Press the down arrow key twice. The first screen in a series of seven displays:

11.5.3. DIAGNOSTICS Screen 1: Sensor Data Register

NOTE: Please refer to Section 8.10.2., Diagnostic Screen Overview for a complete list of values and definitions.

```
DIAGNOSTIC INFO
x-PRESS :
x-P VOLT:
x-VAC P :
```

- PRESS is the current absolute manifold pressure in PSIA along with the output voltage of the pressure sensor. This value should always be 0.2 to 1.0 PSIA below ambient.
- P VOLT is pressure sensor output voltage.
- VAC P is the current absolute manifold pressure in PSIA along with the output voltage of the pressure sensor. This value should always be 0.2 to 1.0 PSIA below ambient.

Press the down arrow key to display the second screen:

11.5.4. Screen 2: Sensor Data Register

```
x-BOX T :
x-BOX V :
x-BNCH T:
x-BNCH V:
```

- BOX T is enclosure temperature in degrees C along with the raw voltage from the temperature sensor.
- BOX V is box temperature sensor output voltage.
- BNCH T is optical bench temperature in degrees C. The current IR sensor temperature in degrees C as well as the raw voltage coming from the temperature sensor itself. This value can range from ambient to ambient +15 degrees C.
- BNCH V is bench temperature sensor output voltage.

Press the down arrow key to display the third screen:

11.5.5. Screen 3: Sensor Data Register

```
x-AMB P :
x-BNCH Z:
x-BOX Z :
```

- AMB P is measured every purge cycle with the sample pump off and the manifold open. Its value is weather and altitude dependent and can range from 10.0 to 15.5 PSIA.
- BNCH Z is optical bench temperature in degrees C at last zero interval.
- BOX Z is box temperature in degrees C at last zeroing.

Press the down arrow key to display the fourth screen:

11.5.6. Screen 4: Sensor Data Register

```
x-PEAK C:
x-PEAK V:
x-AVG  V:
x-ZERO V:
```

- PEAK C is the current peak to peak A/D counts from detector.
- PEAK V is the current peak to peak voltage from detector.
- AVG V is the running average voltage from detector.
- ZERO V is the voltage measured at last zeroing and the IR sensor output that was stored during the last purge cycle.

Press the down arrow key to display the fifth screen:

11.5.7.Screen 5: Sensor Data Register

```
x-NOISE :
x-AU    :
x-AVG AU:
x-BNCH P:
```

- NOISE is the largest change in running average: 16-point running average of the noise portion of IR bench output. This reading is valuable mainly when refrigerant is NOT present.
- AU is the current absorbance value.
- AVG AU is the running average of absorbance level (Average Absorbency). In the absence of refrigerant, the absorbency is 0.000AU. When sampling refrigerants, its value varies proportionally with the refrigerant concentration.
- BNCH P is PPM in bench, based on zone gas selection (uncorrected).

Press the down arrow key to display the sixth screen:

11.5.8. Screen 6: Sensor Data Register

```
x-STPPPM:
x-BNCH L:
x-AMB L :
```

- STPPPM is PPM corrected to STP (1 atm, 25 deg C).
- BNCH L is micromoles/liter in bench (uncorrected).
- AMB L is micromoles/liter corrected to ambient pressure.

Press the down arrow key to display the seventh screen:

11.5.9. Screen 7: Communication Statistics

```
SENT  TRY  NO
1: <ct>  <ct>  <ct>
2: <ct>  <ct>  <ct>
3: <ct>  <ct>  <ct>
```

- SENT is total messages sent.
- TRY is number of retries needed for a message.
- NO is no response after all four tries.
- 1: <ct> <ct> <ct> is RLDS 1 count for each statistic.
- 2: <ct> <ct> <ct> is RLDS 2 count for each statistic.
- 3: <ct> <ct> <ct> is RLDS 3 count for each statistic.

Press the down arrow key to go back to the STATUS OPTION screen. Your changes are saved and the data is written. Statistics are cleared on reset.

12 RLDS Setup on REFLECS, E2, and Einstein Controller Interfaces

Dip switch 8 on the Gateway should be set to the OFF position for E2, Einstein and the ON position for REFLECS controllers.

12.1. REFLECS Setup for RLDS

Set dip switch 8 to ON and follow the steps for setting up RLDS units through the REFLECS controller interface:

1. Log on.
2. Press 7 for **Configuration** to reach the **CONFIGURATION** screen.

Input Definitions should be set here to show how the sensor control is linked to the zone. The number of devices and RLDS units are connected to the Gateway and enabled is the number of address slots the Gateway will use.

3. Press 1 for **Input Definitions** to reach the **INPUT DEFINITIONS** screen.
4. Pressing the down arrow several times will get you to the input list of **SENS01-48**. **Bd** (board) is the address of the Gateway, **Pt** (point) is the zone and allows you to define where the sensor input comes from.

The board number for the RLDS setup is the address of the Gateway. If there are three or less RLDS controllers connected to a Gateway, the Gateway address = the RLDS address. However, if there are more than three RLDS controllers, the second Gateway address will be the one entered for the board number, but the RLDS controllers are set 1 to 3 on the second Gateway.

5. Press 0 (zero) to go back to the **CONFIGURATION** screen.
6. Press 7 for **I/O Brd Setup** to reach the **I/O BOARD MENU** screen.
7. Press 2 to **Set Device #'s**.

The Gateway will react as three 16AI boards. The number of RLDS controllers plus the real number of 16AIs = the total number of 16AIs to enter in the next step:

8. At the **I/O BOARD DEVICE NUMBERS** screen, press the down arrow key to reach **Number 16AI Boards** and enter the number of how many 16AI boards and RLDS controllers there are. Press Enter.
9. Arrow down to the **I/O BOARD MENU** and press 0 (zero) twice to go back to the **MAIN MENU** screen.
10. Press 4 for **Sensor Control**.
11. Press 2 for **Setup**--up to 48 sensor control programs are allowed. Select one of the 48 units and press Enter to reach the **SENSOR SETUP** screen.
12. Press the right arrow to move to the **Name** field to change the name, and press the down or right arrow to move to the (sensor) **Type** field. Use the "." and "—" keys to scroll through the options and select **IRLDS**.
13. Use the arrow keys to move off the active fields and press 0 (zero) twice to go back to the main screen.

12.2. E2 Version 3.01 and below Setup for RLDS (without Gateway)

Set dip switch 8 to OFF and follow the steps for setting up RLDS units through the E2 controller interface

1. Log in to the E2 with Level 4 access.
2. Press

- Connected I/O Boards

and Controllers.

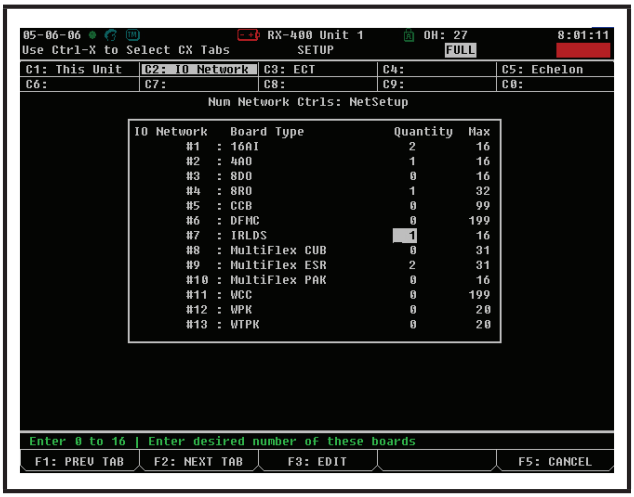

05-06-06 RX-400 Unit 1 OH: 27 8:01:11
Use Ctrl-X to Select CX Tabs SETUP FULL
C1: This Unit | C2: IO Network | C3: ECT | C4: | C5: Echelon
C6: | C7: | C8: | C9: | C0:
Num Network Ctrls: NetSetup
IO Network Board Type Quantity Max
#1 : 16AI 2 16
#2 : 4AO 1 16
#3 : 8DO 0 16
#4 : 8RO 1 32
#5 : CCB 0 99
#6 : DFMC 0 199
#7 : IRLDS 1 16
#8 : MultiFlex CUB 0 31
#9 : MultiFlex ESR 2 31
#10 : MultiFlex PAK 0 16
#11 : WCC 0 199
#12 : WPK 0 20
#13 : WTPK 0 20
Enter 0 to 16 | Enter desired number of these boards
F1: PREV TAB | F2: NEXT TAB | F3: EDIT | F5: CANCEL

Figure 12-1 *- Connected I/O Setup Screen*

3. Under the **I/O Network** tab, set the number of desired RLDS controllers under **IRLDS**.
4. Press the Home key to return to the E2 home screen and save changes.
5. Set the Gateway to 1. Each Gateway can handle three RLDS controllers, so if four RLDS controllers are on the network, two Gateways are needed. The first Gateway will be address 1 and the RLDS units are numbered as 1,2,3. The second Gateway will be addressed as 4, but the RLDS is set to 1 because all units on the Gateway are numbered sequentially 1 to 3. The RLDS controllers are always numbered 1 to 3 when connected to the Gateway.

To see a summary of RLDS controllers on the network:

1. Press Menu % 5 **- Configured Applications**.
2. Select **185.** for **IR Leak Detection**.

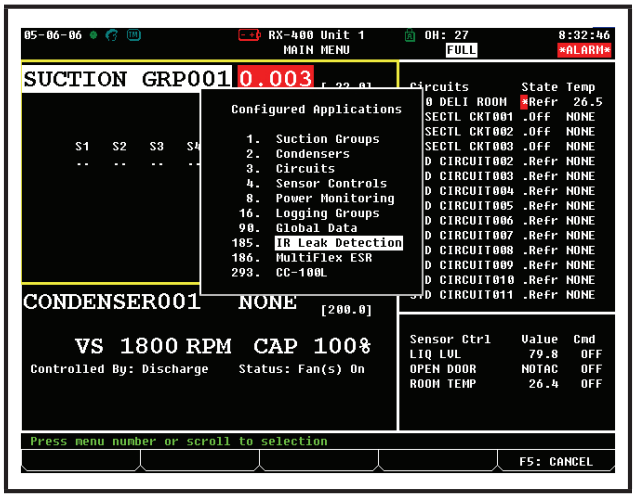


Figure 12-2 *- Configured Applications*

3. The leak detectors are listed on the status screen. Press the down arrow to highlight a unit and F5 to go the setup screen to enter channel, zone information, and more.

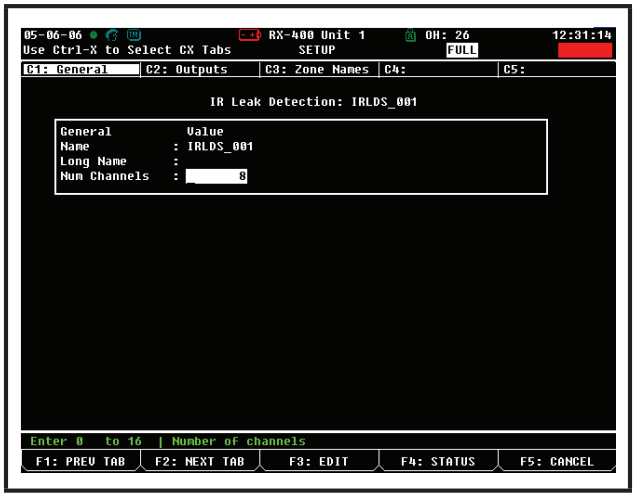

05-06-06 RX-400 Unit 1 OH: 26 12:31:14
Use Ctrl-X to Select CX Tabs SETUP FULL
C1: General | C2: Outputs | C3: Zone Names | C4: | C5:
IR Leak Detection: IRLDS_001
General Value
Name : IRLDS_001
Long Name :
Num Channels : 8
Enter 0 to 16 | Number of channels
F1: PREV TAB | F2: NEXT TAB | F3: EDIT | F4: STATUS | F5: CANCEL

Figure 12-3 *- RLDS Application Setup Screen*

12.3. Einstein Setup for RLDS

Set dip switch 8 to OFF and follow the steps for setting up RLDS units through the Einstein controller interface:

1. Log on.
2. Press F8 for **ACTIONS**.
3. Press Y for **System Setup**.
4. Press 4 for **Network Status/Setup**.
5. Press 2 for **Connected I/O Boards & Controllers** to open the **Network Setup** screen.
6. Under **Boards on I/O Network**, set the RLDS number under **IRLDS Controllers**.
7. Press F9 **HOME** to go back to the Home screen.
8. Set the Gateway to 1. Each Gateway can handle three RLDS controllers, so if four RLDS controllers are on the network, two Gateways are needed. The first Gateway will be address 1 and the RLDS units are numbered as 1, 2, 3. The second Gateway will be addressed as 4, but the RLDS is set to 1 because all units on the Gateway are numbered sequentially 1 to 3. The RLDS controllers are always numbered 1 to 3 when connected to the Gateway.

To see a summary of RLDS controllers on the network:

1. Press F5 for **MORE**.
2. Press L for **Leak Detection**.
3. The leak detectors are listed under **See Summary**. Press the down arrow to highlight a unit and press Enter to show the summary of units listed.

The status screen for the selected RLDS controller is shown.

4. F8 for **ACTIONS**.
5. Press B for **Setup**--you can name the RLDS in the **Name** field.
6. Press the down arrow to the **Num Channels** field to add the number of zones.
7. Press F10 to go back and see the current status of the zones.
8. Press F9 **HOME** to go back to the Home screen.

13 RLDS Maintenance

13.1. Warnings and Cautions

WARNING: Shock hazard! Always disconnect the power supply before opening the enclosure of the monitor.

CAUTION: When working inside the instrument be very careful not to dislodge any electrical wiring or pneumatic tubing. The RLDS contains sensitive electronic components that can be easily damaged. Be careful not to touch or disturb any of these components.

13.2. Charcoal Filter

The charcoal filter removes refrigerant gas from the purge-air stream during the purging process. Replace the charcoal filter *(P/N 275-0275)* approximately every six (6) months, when a zero filter fault occurs (fault code <0100>), or after the monitor has been exposed to unusually high levels of refrigerant gas, such as after an evacuation alarm.

13.3. Hydrophobic Filter

The hydrophobic filter prevents water from entering the detector. A zone flow fault will occur (fault code <0800>) if this filter becomes blocked. Replace the hydrophobic filter as required *(P/N 572-0980)*.

13.4. Servicing Air Lines and Replacing Termination Filters

The gas sample line and optional exhaust line should be checked periodically for obvious signs of kinks, damage and contamination. The gas-sample line and purge-line termination filters prevent dust and dirt from entering the monitor. Both of the filters should be checked periodically.

- A zone flow fault will occur (fault code <0800>) if the gas-sample line filter becomes blocked.
- A purge flow auto will occur (fault code <1000>) if the purge-line filter becomes blocked.

Remove the filter from the line and replace it with a new one *(P/N 275-0300)*.

13.5. Annual Maintenance

To assure peak performance and accuracy of the RLDS, it is recommended that maintenance be performed on an annual basis. This maintenance routine involves replacing all end-of-line filters, charcoal filter, and internal dust filter/water stop. These filters prevent dust and dirt from damaging components of the RLDS such as the solenoid manifolds, infrared sensor, and sample pump. If the RLDS is installed in areas where dust and particulate levels are high, it is recommended that the filters be changed approximately every after three to six months to prevent system faults caused by purge or zone restrictions.

13.5.1. Checking Pump and Bench Diagnostics

During maintenance is a good time to check the diagnostic screen (“DIAG”) to verify that the detector voltage and pump pressures are within optimum parameters. If they are not, a voltage adjustment or scheduled pump replacement could head off a system fault.

To check the pump and detector diagnostics, enter the diagnostic screen by using the front panel keypad and pressing the arrow key to highlight DIAG.

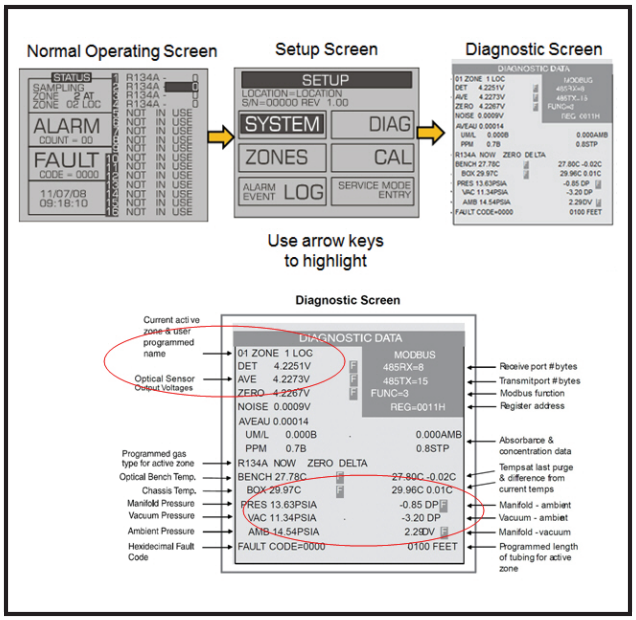


Figure 13-1 *- Navigating to the Diagnostic Screen*

For information about the Diagnostic Screen, refer to **Section 8.10.,** *The Diagnostic Screen*.

13.5.2. Gas Testing

To verify monitor operation, gas testing is recommended. This ensures the integrity of the sample tubing is still intact and the sensor is responding to gas. Gas testing can be done either by “bump testing” or by performing a gas verification test.

A bump test is done by exposing each zone to either a liquid or gaseous refrigerant. The test verifies the sample path and checks that the sensor is responding to gas. The refrigerant concentration is not determined.

A gas verification test is done by exposing each zone to a known concentration of gas and verifying that the display readings are within 10% of the applied gas. Gas verification kits for a variety of refrigerant types are available which contain certified PPM levels of test gas. For more information about gas verification test, refer to **Section 14.1.1.,** *Testing with Gas Verification Kit*.

13.5.3. Annual Maintenance Checklist

Table 13-1 is a checklist to aid in your annual maintenance routines. The RLDS is designed for easy installation and maintenance. For full details about installation, programming, and operation of the RLDS, refer to the appropriate sections in this manual. For illustration of the internal components, see **Section 3.5.,** *RLDS Interior*.

Item	Description	Repaired/ Replaced (Y/N)	Checked/ Completed (Y/N)
1	a. Turn the monitor power off.		
	b. Visually inspect the exterior of monitor for damage and mounting integrity.		
	c. Inspect air sample tubing for damage and leakage at termination points.		
2	Replace the Charcoal purge filter.		
3	Replace the Hydrophobic filter.		
4	Replace the line end filters.		
5	With power off, check all internal wiring terminations and connections.		
6	Close and secure the door and restore power to the monitor.		
7	Check the Detector Voltage Range on the diagnostic screen. The range should be 4.20 to 4.28 volts. If adjustment is required, recycle the power by pressing the reset button at the bottom of the motherboard.		
8	Check the sample pump VAC pressures (typical -3.2 to -3.5 DP) at -2 DP prepare to change out pump on next maintenance cycle.		
9	Check the HGM-RD remote display (if applicable) for existing faults or check the node/time out status.		
10	After a 15-minute warm up cycle, unit enters normal operation. After the unit cycles through all zones, verify that no fault conditions are present.		
11	Gas test zones with bump gas.		
NOTES:	_____ _____ _____ _____		

Table 13-1 *- Annual Maintenance Checklist*

13.6. Replacement Parts and Part Descriptions

Part Number	Item Description
Standard Accessories and Replacement Parts	
808-2004	RLDS 4 Zone, 5 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz
808-2005	RLDS 4 Zone, 5 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway
808-2008	RLDS 8 Zone, 9 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz
808-2009	RLDS 8 Zone, 9 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway
808-2012	RLDS 12 Zone, 13 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz
808-2013	RLDS 12 Zone, 13 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway
808-2016	RLDS 16 Zone, 17 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz
808-2017	RLDS 16 Zone, 17 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz, with HHT and Gateway
808-2018	RLDS 16 Zone, 17 line-end filters, charcoal filter, t-bolt bracket, 120/240 VAC 50/60 Hz
810-3760	RLDS Gateway
573-0000	RLDS 4 Zone Expansion Kit
275-0275	Charcoal Filter
572-0980	Hydrophobic Air Filter
275-0315	Line-end Filter Only
275-0300	Line-end Filter Assembly
275-0304	Two-way Splitter Kit, contains 1 two-way push-fit splitter, 2 line-end filters (sample tubing not included)
275-0305	Three-way Splitter Kit, contains 1 three-way push-fit splitter, 3 line-end filters (sample tubing not included)
270-0810	¼" Sample Tubing (100 ft.)
275-0280	R-22 Gas Verification Kit
275-0281	R-134a Gas Verification Kit
275-0282	R-123 Gas Verification Kit
275-0283	Variable Flow Regulator
275-0284	1031 Cylinder, 100 PPM R-22
275-0285	1031 Cylinder, 100 PPM R-134a
275-0286	1031 Cylinder, 100 PPM R-123
CO_2-RLDS Units	
808-2104	RLDS-Co_2 4 Zone
808-2105	RLDS-Co_2 4 Zone, w/HHT & Gateway
808-2108	RLDS-Co_2 8 Zone
808-2109	RLDS-Co_2 8 Zone, w/HHT & Gateway

Table 13-2 *- RLDS Part Numbers and Descriptions*

Part Number	Item Description
808-2112	RLDS-Co_2 12 Zone
808-2113	RLDS-Co_2 12 Zone, w/HHT & Gateway
808-2116	RLDS-Co_2 16 Zone
808-2117	RLDS-Co_2 16 Zone, w/HHT & Gateway
HGM-MZ Accessory Kits and Filters	
275-0315	Line End Filter Only
275-0231	Line End Filter Assembly
275-0275	Charcoal Filter Assembly with Fittings
275-0232	Internal water stop
275-0233	End-of-Line Water Stop
275-0234	In-line Water Trap
275-0235	In-line Water Trap, Replacement Filter Element
275-0236	In-line Water Trap, Mounting Bracket
275-0237	4-Zone Annual Maintenance Kit
275-0238	8-Zone Annual Maintenance Kit
275-0239	12-Zone Annual Maintenance Kit
275-0240	16-Zone Annual Maintenance Kit
275-0241	Maintenance kit Internal filters only (Charcoal Filter and Hydrophobic filter)
275-0242	4 Zone Line End Filter Kit (4 line end filters)
Single & Multi-Zone Replacement Parts	
275-0250	Power Fuse, 1 Amp, 250 VAC
275-0390	NiCad Battery
275-0251	MZ Key Pad PC Board
275-0252	4 Zone solenoid block
275-0253	5 Zone solenoid block (Zones 1 - 4 w/ purge port)
275-0254	I/R Field replacement kit (halogen gases) (both single and multi-zone)
275-0255	I/R Field replacement kit (ammonia gas) (both single and multi-zone)
275-0256	Valve/ Pump Drive PC Board
275-0257	Remote Display Main PC Board
275-0258	Display PC Board (Multi-zone)
275-0259	Universal Power Supply (Both Single and Multi-zone)
275-0260	Power Entry Board (Both Single and Multi-zone)
275-0261	Main PC Board (Multi-Zone only)
275-0262	Microcontroller PCB (Multi-zone)
275-0263	Pump with Connector (both Single and Multi-Zone)

***Table 13-2** - RLDS Part Numbers and Descriptions*

14 Appendix: RLDS Calibration

14.1. Calibration Check

The RLDS provides for the continuous monitoring of refrigerant gas levels in up to 16 separate test zones or channels. The instrument can be programmed to monitor a variety of refrigerants and independent leak (small), spill (medium), and evacuation (large) levels may be designated for each zone. Below are the steps for testing the calibration or gas verification of the RLDS unit using a gas verification kit and reference gas cylinder to measure the calibration of the unit.

14.1.1. Testing with Gas Verification Kit

Materials Required

- Reference gas cylinder
- Variable flow regulator
- RLDS unit

Steps

1. Go to Step 3 if the RLDS is powered up and communicating.

   Verify that the RLDS is communicating on power up: In the upper left corner of the RLDS screen, the message **CHECK NODE** will display first. When the unit is communicating properly, **CHECK NODE** will be replaced by the name programmed into the unit.

2. When the unit is communicating normally, it will be in warm-up mode. Allow the warm up cycle to complete before proceeding to the next step (approximately 15 minutes.).

3. Connect:

   - The variable regulator (*P/N 275-0283*) to the reference gas cylinder.
   - The 3/16” tubing to the output of the regulator.

4. Disconnect the existing tubing from Zone 1 on the RLDS.

5. From the RLDS Main menu, press the Enter button and select **System Setup**.

   1. From the **SETUP** menu, select **SYSTEM**.
   2. Navigate to **Zone Hold** and set to 15 minutes.
   3. Select **ReZero Mode** and change to **Auto**.
   4. Return to the Main Setup by pressing the **ESC** button.

6. Enter the **Zones** menu from the Main Menu. In Zone 1:

   1. Select **Refrigerant** and change the selection to match the type of refrigerant located on the reference cylinder.
   2. Select **Distance** and change to **5** ft.
   3. Return to the System Menu by pressing the **ESC** button twice.

7. From the RLDS System Menu, press the button that corresponds to **Zones** on the menu to go into the Zone View Menu.

   1. Select the zone at the top level screen.
   2. Press and hold down the **ENTER** key until the unit beeps. The word **HOLDING** will blink in the status box.
   3. While in the hold mode, further investigation of the zone's status can be made by navigating to that zone’s *Setup Screen 1*.
   4. To release the zone from the Hold Mode, press and hold down the **ENTER** key until the unit beeps and the screen display returns to normal.

8. Arrow over to **System Setup**.

   Enter the Diagnostic screen by pressing **DIAG**.

9. Verify that the unit is not in a purge cycle. This can be done by verifying the airflow in Zone 1. Review and record the pressure **(PRES**) reading in the diagnostic screen. If the unit is in a purge cycle, wait until **PURGING** stops flashing and then review and record the **PRES** reading in on the diagnostic screen.

10. Connect the tubing from the reference flow regulator to Zone 1 on the manifold of the RLDS.

NOTES:

- **The RLDS Fault LED may illuminate until gas starts to flow from the reference cylinder to the RLDS**. The pressure should be below the

original reading. If the reading does not drop, the unit may be in the purge cycle. If so, wait until the purge cycle ends before continuing. Slowly adjust the variable flow regulator in a clockwise direction until the pressure is the same as the original reading.

- **You may have to block or partially block the relief valve on the variable pressure regulator in order to achieve the appropriate pressure**. Allow about 1 minute to stabilize, and then read the first ppm value in the diagnostics screen. The reading should be within +10% of the actual concentration listed on the cylinder.
- **The unit may go into a purge cycle during the test process**. If this happens, the ppm reading will drop to approximately 0. This does not affect the verification results. However, in order to obtain a valid ppm reading, the unit must be drawing from Zone 1.

11. Close the reference gas cylinder by adjusting the variable flow regulator in a counterclockwise direction until it is fully closed. Reset Zone 1 information (distance, refrigerant, zone hold time) as desired for normal operation.
12. If the reading in **Step 10** is not within +10% of the actual concentration listed on the cylinder, verify:
    - The pressure reading from **Step 9**.
    - The tubing is securely connected to the cylinder and Zone 1 input port.
    - The proper refrigerant is selected (**Step 6**).
    - The unit is in hold for Zone 1.
    - That there is proper pressure from variable flow regulator (**Step 10**).
    - That enough time was given for readings to stabilize and the reading was not taken during a purge cycle (**Steps 9** and **10**).

If the unit still does not measure within +10% of the concentration listed on the cylinder, please contact Emerson Retail Solutions at 770-425-2724.

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